



# City Sanitation Plan



Ahmedabad  
December 2012



Prepared for



**Ahmedabad Municipal  
Corporation**



Prepared by



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## Ahmedabad Municipal Corporation



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For more information:



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The Urban Management Centre is a not-for-profit organization based in Ahmedabad, Gujarat, working towards professionalizing urban management in India and South Asia. UMC provides technical assistance and support to Indian state local government associations and implements programs that work towards improvement in cities by partnering with city governments. UMC builds and enhances the capacity of city governments by providing much-needed expertise and ready access to innovations on good governance implemented in India and abroad. UMC is a legacy organization of International City/County Management Association (ICMA) and hence is also known as ICMA-South Asia.

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## Abbreviations

ADB	Asian Development Bank
AMC	Ahmedabad Municipal Corporation
AMTS	Ahmedabad Municipal Transport Service
APWA	American Public Works Association
ATIRA	Ahmedabad Textile Industry's Research Institute
AUDA	Ahmedabad Urban Development Authority
AWAG	Ahmedabad Women's Action Group
BOO	Build Operate Own
BPMC Act	Bombay Provincial Municipal Corporations Act
BRTS	Bus Rapid Transit System
C&D	Construction & Demolition
CA	Chartered Accountant
CBO	Community Based Organisation
CEPT	Centre for Environmental Planning Technology
CETP	Common Effluent Treatment Plant
CPHEEO	The Central Public Health and Environmental Engineering Organisation
CSP	City Sanitation Plan
CSR	Corporate Social Responsibility
cu.m.	Cubic Metre
EDI	Entrepreneurship Development Institute
FGD	Focussed Group Discussion
GIDC	Gujarat Industrial Development Corporation
GIS	Geographical Information System
GLI	Gandhi Labour Institute
GMFB	Gujarat Municipal Finance Board
Gol	Government of India
GPCB	Gujarat Pollution Control Board
GPRS	General Packet Radio Service
GPS	Global Positioning System
H&K	Hotels' & Restaurants' Kitchen
ha	Hectare
HH	Household
IEC	Information, Education and Communication
IIM	Indian Institute of Management
INR	Indian Rupee
ISRO	Indian Space Research Organisation
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
km	Kilometre
KSSM	Kamdar Swasthya Suraksha Mandal
lpcd	litres per capita per day
MBA	Masters of Business Administration

MCD	Municipal Corporation of Delhi
MHT	Mahila Housing Trust
ML	Million Litres
MLD	Million Litres per Day
mm	Millimetre
MoEF	Ministry of Environment & Forests
MOU	Memorandum of Understanding
MoUD	Ministry of Urban Development
MSL	Mean Sea Level
MSW	Municipal Solid Waste
MSWM	Municipal Solid Waste Management
MT	Metric Tons
NA	Not available
ND	Not defined
NGO	Non Government Organisation
NGSY	Nirmal Gujarat Shauchalay Yojana
NID	National Institute of Design
NOC	No Objection Certificate
NRCP	National River Conservation Plan
NRW	Non Revenue Water
NUSP	National Urban Sanitation Policy
O&M	Operation and Maintenance
OD	Open Defecation
OWC	Organic Waste Converter
PGR	Public Grievances Redressal
PHS	Public Health Supervisor
PPP	Public Private Partnership
PRL	Physical Research laboratory
RCC	Reinforced Cement Concrete
RDF	Refuse Derived Fuel
RWA	Residents' Welfare Association
SEWA	Self-Employed Women's Association
SI	Sanitary Inspector
SLB	Service Level Benchmarks
SMC	Sound Material Cycle
SOP	Standard Operating Procedures
SPERI	Sardar Patel Economic Research Institute
SPIPA	Sardar Patel Institute of Public Administration
SPV	Special Purpose Vehicle
sq.km.	square kilometre
sq.m.	square metre
SSI	Sanitary Sub Inspector

STP	Sewage Treatment Plant
SWD	Storm Water Drainage
SWM	Solid Waste Management
TPD	Tons Per Day
ULB	Urban Local Body
UMC	Urban Management Centre
USD	United States Dollar
USEPA	United States Environment Protection Agency
WDS	Water Distribution Station
WoW	Wealth out of Waste

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Manvita Baradi  
Director, Urban Management Centre

## Disclaimer

The scope of this report is to present the results of our detailed analysis and understanding of sanitation situation in Ahmedabad Municipal Corporation (AMC) jurisdiction. Our conclusions are based upon information drawn from research of the relevant sectors, data collected from AMC, discussions with the respective departments and our own sector expertise. No representation or warranty, express or implied, is given by Urban Management Centre (UMC) or any of its respective partners, officers, employees, or agents as to the accuracy or completeness of the information, data or opinions provided to UMC by third parties.

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With this report, UMC intends to provide only professional advice to AMC on various sanitation and related issues identified herein. This report also presents recommendation on what UMC believes is the most suited solution for sanitation issues identified, amongst various other alternatives that may exist.

## Preamble

Ahmedabad Municipal Corporation invited Urban Management Centre for preparation of City Sanitation Plan for AMC jurisdiction in July 2011. UMC conducted numerous visits since July 2011 for the purposes of data collection, field visits, interaction with ULB officials, citizens, focussed groups, etc. In addition to data collection, detailed site visits were conducted at the following locations to assess the status of municipal services:

- Waste collection points in residential, commercial, and special (including meat & vegetable) market areas; formal and informal open dumping sites in and around the city, etc.
- Natural water bodies including *nalas*, river, lakes, ponds, etc. to assess the environmental degradation caused due to lack of municipal sanitation services in the city.
- Public toilets, urinals and open defecation (OD) spots
- Areas facing problems of flooding, water logging, etc.
- Special areas such as railway station, Gujarat University, other campuses of large institutional areas, GIDC estates in the city, etc.
- Some select outgrowths/ contiguous settlements to the city

Other site visits included areas such as the slums, residential areas, municipal civic centres, retail and wholesale markets, health and educational institutions, etc.

The purpose of these detailed field visits was to establish a qualitative relationship between the statistical details provided by the ULB with the actual ground realities, which in many cases, were found to be in conflict with each other.

In congruence with guidelines laid by NUSP, AMC conducted the City Sanitation Task Force's first Consultation Workshop on February 21, 2012. Based on the stakeholder's feedback, their vision for development of their city over the next 25 years, and their priorities, first draft of the proposals to fulfil any gaps at AMC's end in sanitation services were then prepared and a broad sector wise investment was estimated for the next 25 years. Based on the verification of collected data by AMC, UMC conducted further studies to summarise the findings and present proposals to fill any gaps in sanitation services.

This Final City Sanitation Plan Report presents the a) sector wise assessment of AMC' sanitation services, b) stakeholder's feedback for improvement of sanitation in the city, c) proposals under this CSP for fulfilling the gaps, and e) a broad cost estimate for all the proposals.



# 1. Introduction to National Urban Sanitation Policy

The Government of India launched its National Urban Sanitation Policy in November 2008 with the goal of making India “community-driven, totally sanitized, healthy and liveable cities and towns”. The policy advocates that all cities would become open defecation free, all human wastes and liquid wastes will be collected and safely treated and adequate resources will be available for the operation and maintenance of the sanitation facilities.

As sanitation is a state subject, states would be required to develop state sanitation strategy that articulates its vision for accomplishing the goals of the National Urban Sanitation Policy. Cities which are responsible for sanitation will be required to develop city sanitation plans, implement and maintain the infrastructure facilities.

***Sanitation is defined as safe management of human excreta, including its safe confinement treatment, disposal and associated hygiene-related practices.***

While this policy pertains to management of human excreta and associated public health and environmental impacts, it is recognized that integral solutions need to take account of other elements of environmental sanitation, i.e. solid waste management; generation of industrial and other specialized/ hazardous wastes; drainage; as also the management of drinking water supply.

The Millennium Development Goals (MDGs) enjoin upon the signatory nations to extend access to improved sanitation to at least half the urban population by 2015, and 100% access by 2025. This implies extending coverage to households without improved sanitation, and providing proper sanitation facilities in public places to make cities open defecation free.

## Vision

The vision for Urban Sanitation in India is:

**All Indian cities and towns become totally sanitized, healthy and liveable and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women.**

### 1.1. Concept of Totally Sanitized Cities

A totally sanitized city will be one that has achieved outputs or milestones specified in the National Urban Sanitation policy, the salient features of which are as follows:

- Cities must be open-defecation free and provide access to toilets for poor people.
- Must eliminate the practice of manual scavenging and provide adequate personnel protection equipment that addresses safety of sanitation workers.
- All wastewater should be safely collected, treated and disposed.
- Recycle/reuse of treated wastewater for non-potable purposes should be implemented wherever possible.
- Solid waste collected and disposed safely.

- Services to the poor and systems for sustaining results.
- Improved public health outcomes and environmental standards.

## **1.2. Need for City Sanitation Plans**

The City Sanitation Plan (CSP) is aimed at developing and maintaining a clean, safe and pleasant physical environment to promote social, economic and physical well-being of all sections of the population. It encompasses plan of action for achieving 100% sanitation in the city through demand generation and awareness campaign, sustainable technology selection, construction and maintenance of sanitary infrastructure, provision of services, O&M issues, institutional roles and responsibilities, public education, community and individual action, regulation and legislation.

The principal components of city-wide approach include:

- a) Collection and sanitary disposal of wastes, including solid wastes, liquid wastes, excreta, industrial wastes, clinical and other hazardous wastes;
- b) Storm water drainage;
- c) Cleansing of thoroughfares, markets and other public spaces;
- d) Environmental sanitation education;
- e) Inspection and enforcement of sanitary regulations;
- f) Monitoring the observance of environmental standards.

The City Sanitation Plans will be prepared after assessing the situation analysis and with wide consultation with stakeholders. The Plan will be based on the following considerations:

- To adopt a demand-based strategy and community participation in planning, implementation and management of sanitation infrastructure.
- To adopt locally suitable methods, technology and materials, and provide necessary facilitation support to the Municipal Corporation/ Municipality.
- To encourage community and private participation and define their role in creation and maintenance of the sanitation infrastructure, and thereby ensure a sense of ownership.
- To ensure coordination between various departments working in the field of water supply and sanitation, such as health, education, public health and engineering department, industry, environment, transport, pollution control board, etc.
- To ensure an optimum use of funds allocated by the 12<sup>th</sup> and 13<sup>th</sup> Finance Commissions for solid waste management.
- To coordinate various externally aided projects for their optimum results.

In the City Sanitation Plan, it has taken several steps to improve the quality of life of its urban population, with the special focus on urban poor. It has taken several steps towards this endeavour and is continuing to do so. Provision of universal access to safe drinking water and sewerage facilities is a prime need to enhance quality of life in a community, especially of the urban poor.

## 2. Formation of City Sanitation Task Force (CSTF) & its Roles & Responsibilities

The Corporation formed a multi-stakeholder City Sanitation Task Force (CSTF) as envisaged under the NUSP. The City Sanitation Task Force (CSTF) has been formed with representatives from various walks of life. A list of the members of City Sanitation Task Force is as below:

**Table 1 List of Members of City Sanitation Task Force**

City Sanitation Task Force		
<b>Chairman</b>	Hon. Mayor of Ahmedabad	Mr. Asit Vora
<b>Convener</b>	Municipal Commissioner, AMC	Dr. Guruprasad Mohapatra
<b>Secretary</b>	City Engineer, AMC	Mr. Tarun Lad
<b>Members</b>	<b>Other Government Departments</b>	
	Chief Executive Authority, AUDA	Ms. Mamta Verma, IAS
	HOD of Sewerage Department, AMC	Mr. Falgun Mistry
	HOD of Solid Waste Department, AMC	Mr. Naresh R. Rajput
	HOD of Health Department, AMC	Dr. S. P. Kulkarni
	HOD of Storm Water Drainage Department, AMC	Mr. M. K. Shah
	Gujarat Urban Development Mission	B. J. Vyas
	Gujarat Urban Development Company Ltd.	Mr. P. G. Gadani
	Gujarat Pollution Control Board	Mr. A. A. Dolati
	Indian Railways	Mr. Praveen Kumar
	Gujarat Chamber of Commerce & Industries,	Mr. Shailesh Patwari
	Representatives of unions of <i>safai karamcharis</i> , sewerage sanitary workers, etc.	Mr. Harish Chawda
	<b>Academic Institutions</b>	
	Indian Institute of Management, Ahmedabad	Dr. Prem Pangotra
	CEPT University	Prof. Mona Iyer
	All India Institute of Local Self Governance	Mr. Nachiket Dhruv
	<b>NGOs</b>	
	Ahmedabad Women's Action Group	Ms. Ilaben Pathak
	Mahila Housing Trust	Ms. Bijal Bhatt
	SAATH	Mr. Rajendra Joshi
	Environmental Sanitation Institute	Mr. Jayesh Patel
	<i>Akhil Bhartiya Paryavaran/</i> Gujarat Sanitation	Mr. A.K. Mishra
	<b>Slum Dwellers</b>	
	<i>Vikasini</i> (city based federation of CBO supported by Mahila Housing Trust)	Ms. Kokilaben Vora
	Resident of the Bavaji na Chhapra, Khokhra Ward, East Zone.	Mr. Ramlingan Achipan Nayyar

CSTF members have been active in providing valuable feedback for preparation of this CSP. The key roles of the CSTF to be undertaken for implementation of the CSP as defined by NUSP have been listed below.

**1. Launching City Level 100% Sanitation Campaign** - Using IEC Campaigns as an effective tool for the following topics:

- 500 NOC Scheme
- Providing new sewerage connections
- Solid Waste Management Activities (ongoing)
- Improving interaction between citizens and AMC by improving Public Grievances Redressal System (PGRS)
- Creating awareness about various central, state and local individual toilet schemes
- Septage management
- Sensitisation towards preventing pollution in water bodies and improvements in the environment through improved sanitation
- General health related awareness campaigns

**2. Introducing a Report Card Mechanism at Ward/Area Sabha Level**

**3. Adopting Standards for Various Infrastructure Services & other performance indicators**

Services to include

- Environment outcomes
- Health Outcomes
- Processes
- Infrastructure
- Service Delivery

In addition to CSTF, AMC has also initiated parallel efforts to improve sanitation in the city. Some of these parallel efforts include preparation of SWM Master Plan 2031 towards achieving Zero Garbage city; and IEC campaign for creating awareness related to solid waste management in the city. Additionally, the CSTF should also ensure that the implementing agency (AMC) should create GIS database of all sanitation related services.

### 3. City Sanitation Task Force Consultation 01

The 1<sup>st</sup> City Level Stakeholder Consultation was conducted for preparation of City Sanitation Plan (CSP), Ahmedabad at Ahmedabad Municipal Corporation (AMC) office on February 21, 2012 at 1700 hrs in the Standing Committee Meeting Room, 3<sup>rd</sup> Floor, AMC Building, Danapith, Ahmedabad.

Representatives from the following organisations were present for the consultation:

1. Ahmedabad Municipal Corporation
2. Gujarat Chamber of Commerce and Industry
3. Gujarat Urban Development Mission
4. Gujarat Urban Development Company Ltd.
5. Indian Railways
6. Gujarat Pollution Control Board
7. CEPT University
8. IIM Ahmedabad
9. SAATH
10. *Akhil Bhartiya Paryavaran Sansthan*
11. Mahila Housing Trust (MHT)

Complete list of participants has been provided in Annexure 1.

The meeting was initiated with a welcome note by Mr. Tarun Lad, City Engineer, AMC. Post the welcome note Urban Management Centre (UMC) made a presentation to the members present. The presentation included the

- Context of the NUSP
- Need for a CSP
- The CSP Preparation Process as per the NUSP
- Sanitation Situation Analysis and Gaps in Services in Ahmedabad in Waste Water, Sanitation, Storm Water Drainage, Solid Waste Management, Environmental and Public Health
- Way Forward

The key points discussed during the meeting have been summarised below.

#### **General**

- Dr. Guruprasad Mohapatra, IAS, Municipal Commissioner, AMC suggested addition to 2 representatives from slum areas to be included in the task force. The Municipal Commissioner (MC) requested Mahila Housing Trust (MHT) to suggest names for the same.
- Dr. Prem Pangotra, IIM Ahmedabad suggested creation of singular integrated MIS system for spatial and non-spatial data which can be used by all departments of AMC for various purposes.

#### **Sewerage**

- Prof. Mona Iyer, CEPT University suggested strengthening faecal sludge management (FSM) mechanisms to provide for shortfalls in underground drainage systems. FSM can be used as an intermediate arrangement as sewerage network is expanded and full coverage by connections is achieved gradually.

- Mr. Tarun Lad, City Engineer, AMC mentioned that the service procurement of contracting agencies for reuse of treated sewage is in progress and he informed that MOUs have been signed and work orders would be issued by December 2012.
- UMC presented data regarding quality testing of treated sewage. In response to this, Mr. Lad pointed out that Gujarat Industrial Development Corporation (GIDC) is responsible for providing sewerage services in GIDC industrial areas of Ahmedabad. Outfall point of AMC's and GIDC's treated sewage is common and GIDC has failed on many occasions to maintain the desired quality.

#### **Sanitation**

- Data regarding open defecation in Ahmedabad was presented by UMC. Mr. Anand Patel, Additional City Engineer, SNP Cell, AMC requested UMC to update the data regarding open defecation spots in the city based on a survey conducted by SNP Cell in 2011. Mr. Patel would provide the same to UMC.
- In continuation of discussion over open defecation, MC suggested inviting Trichy Municipal Corporation for making a presentation at AMC on OD Free city.
- Ms. Bijal Patel (MHT) expressed that NGOs are capable and willing to manage public toilets in the city. However, AMC expressed concerns over credibility of many NGOs they have scrutinised in the past for the same.

#### **Storm Water Drainage**

- AMC requested updating data presented with local office of Indian Meteorological Department for rainfall in Ahmedabad.
- Mr. Lad informed the members present that AMC has undertaken lake interlinking project which assists in rain water harvesting in Ahmedabad.

#### **Solid Waste Management**

- Dr. Pangotra suggested that AMC should facilitate smoothening forward market links for fuel pellets and other products generated by processing municipal solid waste.
- Ms. Patel (MHT) reported that many private contractors responsible for Door/Gate to Dump collection skip chawls and slum due to reasons such as narrow roads where vehicle have difficulty in entering.
- MC also informed the members present that AMC is planning to contract lifting, processing and disposal of waste generated from dead animals on BOT basis.

The meeting was concluded by a word of thanks and request for continued support from the MC.

## 4. Service Level Benchmarking

### 4.1. SLB of Ahmedabad Municipal Corporation

The Ministry of Urban Development (MoUD), Govt. of India in the year 2010 has initiated an exercise to define Service Level Benchmarks (SLBs) and constituted a 'Core Group for Service Level.

Service level performance parameters have been identified for four basic urban services:

- Water Supply;
- Sewage;
- Solid Waste Management (SWM); and
- Storm Water Drainage

These parameters have been defined primarily from a utility manager's/planner's perspective. In other words, the parameters highlight the performance as would be monitored by the leadership/management of ULBs or other civic agencies. These performance measurements will need to be carried out by the service delivery agencies themselves, reported to higher levels of management and also disseminated widely.

The principle of accountability for service levels is now gaining broad based acceptance at all levels. The ULBs are at the forefront of this shift, based on the decentralization agenda articulated under the 74th Constitutional Amendment.

The principle of benchmarking has been further endorsed by the 13th Finance Commission which has included Service Level Benchmarking as one of the conditionalities for allocation of performance based grants to ULBs, which amount to approx. INR8000 crores over the period 2010-15.

As part of the SLB exercise, Ahmedabad Municipal Corporation was selected for the SLB pilot study. The pilot project was implemented in 28 urban local bodies spread across 14 States and 1 Union Territory in India for compiling data for the financial year 2008-09. AMC was also selected among 12 cities for receiving funding for improvements in data quality as per the information system improvement plan initiative under the SLB.

### 4.2. National Sanitation Ranking 2009, MoUD: Ranking of Ahmedabad Municipal Corporation

The Government of India announced a National Urban Sanitation Policy with a view towards making all Indian cities and towns to become healthy and liveable as well as ensure the health and well being of its citizens. The policy advocates that all cities would become open defecation free, all human wastes and liquid wastes will be collected and safely treated and adequate resources will be available for the operation and maintenance of the sanitation facilities.

In order to promote urban sanitation and recognize excellent performance in this area, the Government of India has instituted an annual award scheme for cities. The award is based on the

premise that improved public health and environmental standards are the two outcomes that cities must seek to ensure quality of life for urban citizens. The awards are not merely an assessment of hardware or expenditure incurred in urban sanitation but how these lead to achievements of milestones of 100 % safe disposal of wastes from the city on a sustainable basis.

For the assessment, The Ministry of Urban Development has identified a set of output, process and outcome indicators that have been used to assess the existing sanitation conditions in the city. The list of indicators pertain to the practice of open defecation, access to sanitation (individual, community and public), collection, treatment and disposal of solid and liquid wastes, proper upkeep and maintenance of the sanitation infrastructure, clear institutional roles and responsibilities and improvements in health and environment.

The survey was undertaken across 423 cities including Municipal Corporations and Class A cities across the country. In Gujarat, the survey included 26 cities including 7 Municipal Corporations and 19 Class 1 cities of Gujarat.

As per the national ranking, Ahmedabad was ranked 19<sup>th</sup> at the national level. Comparing with its peer mega cities, Ahmedabad ranked third with an overall aggregate mark of 50.286.

**Table 2 Ranking of Mega Cities in National Sanitation Ranking 2009, MoUD**

National Ranking	Mega City	Score
12	Bangalore	53.637
13	Chennai	53.630
19	Ahmedabad	50.286
25	Kolkata	48.965
45	Mumbai (Municipal Corporation of Greater Mumbai)	45.076
88	Hyderabad	40.600
168	Delhi (Delhi Municipal corporation )	36.963

In Gujarat, Ahmedabad also was ranked third after Surat and Rajkot cities.

**Table 3 Ranking of Ahmedabad amongst cities in Gujarat in National Sanitation Ranking 2009, MoUD**

National Ranking	Mega City	Score
3	Surat	69.080
9	Rajkot	56.118
19	Ahmedabad	50.286



The predominant areas where AMC lost marks and which pertain to sanitation are discussed below:

Indicator No.	Indicator	AMC Score	Out of	Reasons for scoring (as of March 2009)
1.a.i	Access and use of toilets by urban poor and other un-served households by individual and community sanitation facilities	0.00	4	<p>On-site observation and Respondent survey of 6 large slums selected in consultation with AMC.</p> <p>Based on respondent surveys- 27% slum population of these slums practice open defecation. As per the slabs in the marking scheme of MoUD; any city with more than 15% slum population practicing open defecation will receive no marks.</p>
1.a.ii	Access and use of toilets by floating and institutional populations	2.50	4	<p>Based on onsite observations of functionality of public toilets at public areas (6 places-bus stand, railway station, market areas, office area, and recreational areas).</p> <p>All toilets visited were found functional. However, 3 cases of open urination/defecation were observed. Hence AMC loses ( 3*0.5) 1.5 marks)</p> <p>Based on the marking scheme of MoUD- "Deduct 0.5 Marks for each instance of open urination or open defecation visible in each sample observation location up to a maximum of 2 points being deducted in such a manner"</p>
1.a.iii	No open defecation (OD) visible	0.67	4	<p>Based on number of open defecation instances that were visible in slums, public places, near railway tracks.</p> <p>Out of 12 places, OD instances were seen at 8 places.</p> <p>As per the MoUD Marking Scheme, "deduct[(proportion of field visits where OD was visible/total no. of field visits) multiplied by2]</p>
1.b	Proportion of total human excreta generation that is safely collected	5.00	6	<p>96% of properties are either connected to a sewer connection or has a soak pit/septic tank.</p> <p>As per the MoUD Marking Scheme; cities where 90-100% properties are connected to sewer/ soak pit/ septic tank; will receive 5 marks.</p>
1.c	Proportion of total black waste water generation that is treated and safely disposed off	6.00	9	<p>80% of waste water generated in city is treated to secondary treatment ( 592 MLD treated out of 740 MLD generated)</p> <p>As per the MoUD Marking Scheme, cities with treatment capacity of 80-90% will receive 6 marks.</p>
1.d	Proportion of total grey waste water generation that is treated and safely disposed off	0.00	3	No separate grey water collection system in the city.
1.e	Proportion of treated wastewater that is re-cycled and re-used	0.00	3	No recycling of water ( as on 31 <sup>st</sup> Dec 2009)

Indicator No.	Indicator	AMC Score	Out of	Reasons for scoring (as of March 2009)
1.f	Proportion of total storm-water and drainage that is efficiently and safely managed	2.00	3	1557.92 kms of storm water drains vis-a-vis a total road length of 2400 kms= 65%.  As per the MoUD Marking Scheme, cities with 60-100% coverage of storm water drainage will receive 2 marks.
1.g	Proportion of total solid waste generation that is regularly collected	1.00	4	2683 Tons collected vis-a-vis generation of 3252 Tons= 83%  Cases of littering observed at 14 places out of 18 places visited. Hence AMC loses 2 marks.  As per the MoUD Marking Scheme, cities with 80-100% solid waste collection receives 3 marks. deduct 0.25 mark for every instance of solid waste observed to be visibly littered in the city with a maximum of 2 marks to be deducted
1.h	Proportion of total solid waste generation that is treated and safely disposed off	0.00	4	AMC treats 1000 Tons per day and disposes 100 tons at a Sanitary landfill site; which is 34% of waste generated.  As per the MoUD Marking Scheme, cities with 0- 40% of safe disposal of waste generated receive 0 marks.
1.i	City wastes causing no adverse impacts on surrounding areas outside city limits	0.00	5	At 3 sites, on periphery of the city was observed littered with solid waste and there were 2 instances of untreated grey water being discharged into drains/ water bodies.  As per the MoUD Marking Scheme, Award 5 marks for 100% treatment of all types of wastes before letting residues out to land and water bodies outside the city; deduct 2 marks each for any land or water body outside the city receiving any untreated human excreta or untreated solid waste (including leachate), deduct 1 mark for any land or water body outside city receiving untreated grey water (water flowing in drains)
2.a	M & E systems in place tracking incidences of open defecation	2.00	4	AMC lost 2 marks since open defecation data although is being collected and monitored by the Municipal Corporation; the same is not reported on a regular basis in public forums nor are there any incentives given to discourage open defecation.
2.c	All septage / sludge cleaned, safely transported and disposed of after treatment from on-site systems	4.00	5	AMC lost one mark since cleaning and disposal of sludge from tanks and pits is not monitored
2.d	Functioning and maintenance of storm-water drainage systems	3.00	4	AMC lost 1 mark since AMC does not undertake cleaning, repairs and maintenance of drains at any one other season than pre-monsoon.
2.e	Efficiency of solid waste management rules (collection & treatment)	3.00	5	AMC lost marks since there was 0% of waste that is processed or recycled (in a waste recycling facility operated by ULB/agents) and AMC had only 15% of cost recovery in the SWM services.

Indicator No.	Indicator	AMC Score	Out of	Reasons for scoring (as of March 2009)
2.f	Documented operational system and clear institutional responsibility	3.00	4	AMC lost one mark since there AMC has no written manual and procedures existing in practice for Septage
2.g	Deviance on part of polluters and institutions	1.5	3	AMC lost marks since the BPMC Act under which the AMC operates does not explicitly provide for punishing/fining offenders for littering or for Letting out untreated human excreta in the open
3.a	Quality of drinking water in the city	6.16	7	22 out of 25 samples taken (from HHs/slum HHs/ public areas/ hand pumps or public stand posts) passed all tests.  As per the MoUD Marking Scheme, Award 7 X (no of samples with acceptable water quality following Gol standards (failure in any one parameter implying overall "failure") divided by total no of samples tested
3.b	Water quality in water bodies in and around the city	2.80	7	2 out of 5 water bodies passed the required tests (Sabarmati, Kankaria Lake). Tests from Nikole, Chandola, Vastrapur lakes failed the tests.  As per the MoUD Marking Scheme, "Award 7/5 marks for each of the five samples with acceptable water quality following Gol standards (failure in any one parameter implying "failure").
3.c	Reduction in water-borne diseases incidence amongst city-population	0.00	6	AMC lost marks since AMC data does not show a decrease in number of diarrhoea cases from 2006 to 2009.  As per the MoUD Marking Scheme, no decrease gets 0 marks.

Some of the media coverage from the MoUD ranking has been appended in Annexure 7.

## 5. Introduction to Ahmedabad Municipal Corporation

### 5.1. History of Ahmedabad Municipal Corporation

Ahmedabad Municipality came into existence on January 19, 1857 and was recognized by the statute and named as City Municipality in 1873. With the newly formed municipality, Ahmedabad was given the right to elect half the representatives of municipal commission under the local self governance introduced by Lord Ripon, the then Viceroy of India in 1883 (Yagnik & Sheth, 2011).

During the early 20<sup>th</sup> century, Ahmedabad Municipality implemented the first TP Act in 1915 for managing growth of the city. The municipality was suspended for the first time in 1910 and was later resumed in 1924. Later in 1926, it became Borough Municipality. During 1930s, Ahmedabad Municipality raised loans to provide affordable housing to workers by using increased import taxes on cotton. In 1935, AMC started collected 'Halaalkhor Tax' (Scavenger Tax) from residents in order to provide sanitation services to the city. Initial collections neared INR 3 lakh (Ibid).

Post independence, Ahmedabad Municipal Corporation was established in 1950. Upon becoming a corporation, the income of AMC surpassed its expenditure until 1973-74. During this period, with formation of Gujarat and Maharashtra as separate states, Ahmedabad was declared the capital of Gujarat (Ibid).

In 1978, Ahmedabad Urban Development Authority (AUDA) was formed under the Gujarat Town Planning and Urban Development Act, 1976 to regulate additional 300 villages and 9 adjoining municipalities.

During 1980s, AMC entered into an agreement with The World Bank for institutional strengthening. During 1990s and 2000s, municipal tax evasion was a common practice leaving AMC severely impoverished. Improvement in income sources was initiated with strict enforcement of tax and octroi collection during 1990s coupled with initiation of computerisation in the year 1994. In 1995, AMC transformed itself to a surplus ULB and took up several project works.

Later in 1997, AMC got itself credit rating of A+ by CRISIL (a financial management firm). This was followed by issuing public bonds for Public Subscription of INR 1000 million becoming the first urban local body in India to do so. Continuing its efforts to improve governance and services to its citizens, AMC further introduced E-Governance (Ibid).

As of 2012, AMC area is spread over 466 sq km. Spatial distribution of this population within the city over the decades shows that up to 1981 most of the new population added to the city was concentrated within the old AMC limits itself, especially in the eastern part. Ahmedabad grew from 190 sqkm to 466 sqkm in 2006. Expansion of the peripheral areas began in the 1980s and has continued. Earlier only the eastern parts and particularly the eastern periphery registered faster growth rate, but since the 1980s even the western periphery has grown rapidly. The city is currently divided into 64 administrative wards from previously 43 wards. Each ward has three elected municipal councillors with one seat reserved for a woman candidate.

Ahmedabad has a completely decentralised model of urban governance and has been divided into six zones for ease and efficiency of administration. The location of Ahmedabad is shown in the map below:

**Figure 1 Location map of Ahmedabad**



**Table 4 General Information about Ahmedabad**

Item	Unit	Yr. 2011
Number of Wards/Zones	Number	64
Number of Zones	Number	6
Number of Slum Settlements	Number	739
Area	Sq. Km.	466.14
Population	Number	55,68,695
Number of Residential Properties	Number	12,54,175
Number of Non Residential Properties	Number	3,80,849

Source: (AMC, 2012)

Ahmedabad has been flourishing and advancing in its importance in various areas such as commerce, trade, industry, education with aspirations of being recognised as a UNESCO world heritage city owing to its rich cultural past.

The city is growing in tune with the modern science and technology development, contributing for the nation building activities because of enthusiastic entrepreneurship of the local people. This is exhibited by important notable and prestigious institutions established in and around Ahmedabad city, such as Ahmedabad Textile Industry's Research Association (ATIRA), Indian Space Research Organisation (ISRO), National Institute of Design (NID), Indian Institute of Management (IIM), Gandhi Labour Institute, Community Science Centre, Physical Research Laboratory (PRL), Nehru Foundation, Sardar Patel Economic Research Institute (SPERI), Sardar Patel Institute of Public Administration (SPIPA), Centre for Environmental Planning and Technology (CEPT), Entrepreneurship Development Institute (EDI), Self-Employed Women's Association (SEWA), etc.

### **Location, Connectivity and Geography of Ahmedabad**

Ahmedabad – Mumbai Golden Corridor has long been recognized to be an important development axis in Western India. This city of Ahmedabad acts as terminal and has seven major roadways, one express way and five rail networks.

Situated on the banks of the river Sabarmati, the city is located at 22 55' and 23 08' North Latitude and 72 30' and 72 42' East Longitude, at an average altitude of 49 m above Mean Sea Level (MSL).

Sabarmati River originates from Aravalli Hills in Rajasthan and drains into the Gulf of Cambay. On upstream side of Ahmedabad, river Sabarmati is bunded by constructing a dam at Dharoi, which is situated at a distance of 120 km. Further, a barrage has been constructed down-stream of Ahmedabad for diverting river water for irrigation purposes. The barrage is situated at 5 km down-stream of Nehru Bridge of Ahmedabad. Sabarmati river enters AMC limits and flows for 14 km through city with the fall of 13 m in ground level along the river banks. The falling gradient is 1 in 1100 on eastern part of the city. The ground slopes towards the river at a gradient ranging from 1:1250 to 1:1050. On western side, ground level slopes towards river with a higher gradient ranging from 1:500 to 1:1000.

The Sabarmati River runs practically dry throughout the year except a few days during good monsoon years. However, the stretch of Sabarmati River, passing through Ahmedabad city is now fed with Narmada Canal Water. The ambitious project of Sabarmati Riverfront Development aims to create avenues on the banks of the river and keeping the river free from any pollution (refer Section 6.2). The city is divided into 2 parts as east Ahmedabad and west Ahmedabad. The eastern part of the city comprises of old walled city and industrially developed area. The Western part mainly comprises of newly developed residential areas.

Ahmedabad has a tropical monsoon climate, which is hot and dry, except in the rainy season. Summer days are very hot with mean maximum temperature of 41.3° C, while nights are pleasant with mean minimum temperature of 26.3° C. The mean maximum and minimum temperatures in the winter are 30° C and 15.4° C respectively. The average annual rainfall of the area is 740 mm, although there are considerable variations from year to year. The rainfall occurs generally during the months of June to September. The average humidity is 60%, which ranges from 80% to 90% during rainy season.

## **5.2. Governance and Institutional Framework**

### **5.2.1. AMC's regulatory framework – The Bombay Provincial Municipal Corporation Act, 1949**

The governing structure of AMC consists of both-political and administrative wings. As part of the political wing, the corporation has three elected councillors from each of its 64 wards. One third of the councillors are women.

Under the BMC Act, the powers are vested with four distinct statutory authorities of the elected wing, which are the General Body, Standing Committee, Transport Committee and School Board Committee. The General Board is the supreme body of the corporation and the mayor is the chairman of the General Board for conducting its proceedings.

The General Body appoints the mayor and the deputy mayor. It also elects the members for the three statutory committees and 14 other committees. All the policy decisions are taken by the Board. It approves the budget, sanctions appointments and expenditure estimates sent by various departments. The Board meets once every month. Each committee comprises of twelve members, ten from the ruling party and two from the opposition.

The administrative wing is headed by Municipal Commissioner (IAS) supported by 8 Deputy Municipal Commissioners, 6 Assistant Municipal Commissioners, City Engineer and Executive Engineers. With fast growing demand for efficient management, AMC has strengthened top management over the years.

### **5.2.2. 2006 expansion of AMC's jurisdiction and its impacts on Sanitation**

Ahmedabad Municipal Corporation underwent expansion of its jurisdiction in 2006. 17 Nagar Palikas and 27 Gram Panchayats were added to AMC. Many of the erstwhile ULBs were providing services to their citizens but were coping with severe deficiencies. Upon expansion of AMC's jurisdiction, the city level services were being gradually augmented wherever necessary and the institutional restructuring was ensuring provision of services to the newly merged areas at par with remaining of the city (refer Section. A quick comparison of AMC's services in sanitation between pre 2006 and post expansion have been given below:

**Table 5 Comparison of Water Supply SLB Indicators - Pre and Post Expansion (2006) of AMC**

Performance Indicators	Benchmark	Status (post 2006)	Status (pre 2006)	Reliability
<b>Water Supply</b>				
Coverage (%)	100	85	95	B
Per capita supply of water	135	121	158	D
Extent of Metering (%)	100	0	0	
Extent of non-revenue water (%)	15	30.9	21.1	D
Continuity of water supply (Hrs)	24x7	2.25	2.25	B
Efficiency in redressal of customer complaints (%)	80	99.2	99.2	A
Quality of Water Supplied (%)	100	94.8	95.3	B
Cost Recovery (%)	100	53.8	53.8	A
Efficiency in Collection of Water Charges (%)	90	60.3	60.3	A

Source: (AMC, SLB Results Workshop: Presentation by Ahmedabad Municipal Corporation to Ministry of Urban Development, 2009)

**Table 6 Comparison of Sewerage SLB Indicators - Pre and Post Expansion (2006) of AMC**

Performance Indicators	Benchmark	Status (post 2006)	Status (pre 2006)	Reliability
<b>Sewerage</b>				
Coverage of Toilets (%)	100	81.7	98.3	B
Coverage of Sewerage Network (%)	100	65.8	95	B
Collection Efficiency of Sewerage Network (%)	100	64.9	93.7	D
Adequacy of Sewage Treatment Capacity (%)	100	94.5	93.7	D
Quality of Sewage Treatment (%)	100	75.0	75.0	B
Extent of Reuse and Recycling of Sewage (%)	20	0	0	
Extent of Cost Recovery (%)	80	98.5	98.5	A
Efficiency in Redressal of Consumer Complaints (%)	90	58.7	58.7	A

Source: (AMC, SLB Results Workshop: Presentation by Ahmedabad Municipal Corporation to Ministry of Urban Development, 2009)

**Table 7 Comparison of Storm Water Drainage SLB Indicators - Pre and Post Expansion (2006) of AMC**

Performance Indicators	Benchmark	Status (post 2006)	Status (pre 2006)	Reliability
<b>Storm Water Drainage</b>				
Coverage (%)	100	69.6	97.6	A
Incidence of Water Logging	0	214	4	A

Source: (AMC, SLB Results Workshop: Presentation by Ahmedabad Municipal Corporation to Ministry of Urban Development, 2009)



**Table 8 Comparison of Solid Waste Management SLB Indicators - Pre and Post Expansion (2006) of AMC**

Performance Indicators	Benchmark	Status (post 2006)	Status (pre 2006)	Reliability
<b>Solid Waste Management</b>				
Household level coverage (%)	100	75.6	96.4	A
Efficiency in Collection of MSW (%)	100	72.9	-	A
Extent of Segregation of MSW (%)	100	2.7	-	B
Extent of MSW Recovered (%)	80	17.5	-	B
Extent of Scientific Disposal of MSW (%)	100	0	-	
Extent of Cost Recovery (%)	100	26.2	-	A
Efficiency in Collection of SWM Charges (%)	80	58.6	-	A
Efficiency in Redressal of Customer Complaints (%)	90	99.9	99.9	B

Source: (AMC, SLB Results Workshop: Presentation by Ahmedabad Municipal Corporation to Ministry of Urban Development, 2009)

As evident from the tables above, service level of most of the services in pre 2006 AMC have gone down post AMC's jurisdiction expansion. As erstwhile ULBs and Panchayats were struggling in providing services, AMC has been fulfilling these gaps since the expansion. In addition to local bodies and Panchayats, Ahmedabad Urban Development Authority (AUDA) had been providing roads, water supply, storm water drainage and sewerage services to these areas. This infrastructure was transferred to AMC during the jurisdiction expansion.

There are rare instances where services in erstwhile Nagar Palikas have been downgraded or nature of service has been modified to adversely affect the service. One such example is in erstwhile Vejalpur Municipality where it was noted as a leading best practice for Urban Reforms through E-Governance. This system no longer exists in its efficient form anymore.

**Box 1 Best Practice for E-Governance - Vejalpur Municipality (erstwhile)****Urban Reforms through E-Governance- Vejalpur Municipality***(This leading practice dates pre-merger within Ahmedabad Municipal Corporation in 2006)*

Vejalpur is one of the urban conglomerates outside Ahmedabad Municipal Corporation (AMC) limit, and under Ahmedabad Urban Development Authority (AUDA) jurisdiction. However, prior to 2006, Vejalpur was a municipality and like most other ULB's faced issues with regard to the implementation of its role as an agency for service to citizens. In order to remedy the situation, the governing board took a far reaching decision in the early 2000s to computerize most of the roles of the municipality. This action was highly effective, with efficiency levels within the municipality improving, redressal systems functioning, citizens being more satisfied and basic costs of functioning being reduced.

**Situation before the Initiative**

- Because of manual intensity of tasks, the issues were:
- Misplacement of manual records
- Shortage of staff and low pay
- Poor MIS
- Inaccurate tax and interest calculation as well as absence of efficient collection system
- Lack of a complaint and redressal mechanism
- Poor interaction with citizens;
- No single point of service or information, both to management and citizens;
- Lack of transparency and accountability

**Strategies Adopted**

- Computerisation and E-Governance
- Complaints Redressal
- Payments of all municipal Dues
- Online Registration & Issuance of Birth and Death Certificates
- Issuance of Licenses for Shops and Establishments
- On-line information on Infrastructure Projects and Tenders

**Results Achieved**

- Online office administration, monitoring/control mechanisms and service provision introduced – led to better time-management and paperless office administration
- Three civic centres have been established for time-bound complaint redressal and service provision
- General Administration staff not increased
- Transparency, accountability, service delivery improved
- Tax collection increased from 15% to 65%, establishment cost reduced to 8% of the budget income surplus over expenditure achieved

**Sustainability**

Ahmedabad Municipal Corporation (AMC) is happy to have Vejalpur- a well managed municipality, as part of its jurisdiction, which has achieved services to a great extent.

**Lessons learnt**

While E-governance is an excellent tool for achieving good governance, mere computerisation of existing data cannot be taken as e-governance. Political will and dedication of elected wing is an absolute, indispensable necessity for taking significant decisions.

**Transferability**

Many municipalities in Gujarat, on the direction of the Government, are in the process of adapting the Vejalpur e-governance model.

Source: Refer Annexure 10

### 5.3. Demography and Population Growth

The population in Ahmedabad has increased to 55.68 lakh in 2011 from 35.20 lakh in 2001 (AMC, 2011a). The increase has been fuelled by natural growth as well as increase in the jurisdiction from 190 sqkm to 466 sqkm during 2001-11. Historical population growth of Ahmedabad city has been shown in the table below.

**Table 9 Population of Ahmedabad since 1891**

Year	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001	2011
Population (in lakh)	1.85	2.61	2.74	3.82	5.91	8.37	11.49	15.85	20.59	28.76	35.20	55.68

Source: (Census of India, 2001)

The key drivers of population growth have been growth in economic activities such as retail, industries, and tertiary services. Zone wise population details of Ahmedabad municipal area have been indicated in the table below.

**Table 10 Zone wise Demographic Details**

S. No.	Zone	2011	
		Total Population	Total Households
1	North	1,012,760	2,31,224
2	South	988,356	2,25,652
3	East	979,362	2,23,599
4	West	844,661	1,92,845
5	Central	565,288	1,29,061
6	New West	1,178,268	2,69,011
	<b>Total</b>	<b>5,568,695</b>	<b>12,71,392</b>

Source: (AMC, 2012)

From the above table it is evident that the newly added New West Zone has highest population amongst other zones and hence is the major contributor of the demographic growth of the city over the last few years.

Likewise, slum population has also witnessed a large growth, now constituting 14.3 percent of the total population in Ahmedabad. The slum population in Ahmedabad has been shown in the table below:

**Table 11 Slum Population in Ahmedabad**

S. No.	Year	Total City Population	Total Population in Slums	Percentage of Slum Population	Total Slum Households
1	2001	3,520,085	439,843	12.4%	68,994
2	2011 (Provisional)	5,568,695	798,206	14.3%	182,239

Source: (Census of India, 2001); (AMC, 2012)

#### Population Projections

The present population and its growth are the main elements upon which the structure of this city sanitation plan is based. For the purposes of this study, population projections have been used as defined in the Development Plan of Ahmedabad under preparation by Ahmedabad Urban Development Authority (AUDA). The adopted figures are as below:

**Table 12 Projected Population of Ahmedabad till 2021**

Year	Population
2011	55,68,695
2016	64,94,177
2021	75,73,468

Source: (AUDA, Population Projections provided by Ahmedabad Urban Development Authority for Ahmedabad for DP 2021, 2011)

Based on the above population projects, demand for various infrastructure has been computed in the sector wise analysis.

#### 5.4. Slum Profile of Ahmedabad

As of December 2012, around 1.73 lakh households comprising of nearly 7.6 lakh people live in 734 slums in Ahmedabad city. In addition to slums, there are settlements known as '*Chawls*' which used to be earlier considered as 'slum like' but are now excluded owing to clear land titles and/or tenures.

There have been numerous efforts in the past to provide housing and services in slum areas in Ahmedabad. Based on an amendment to the Bombay Municipal Corporation Act 1949 in 1970s, AMC is obligated to spend atleast 10 percent of its annual budget for improving basic services in slums. Some of the programmes/ schemes for slums in Ahmedabad implemented in the past and/or ongoing are listed below:

**Table 13 Slums Improvement Initiative in Ahmedabad in the past**

S. No.	Name of the programme/ scheme	Implementing Agency	Remarks
1	Slum Clearance (unofficial name)	Gujarat Slum Clearance Board (GSCB)	implementing formal housing programmes for low-income groups and upgrading slum areas
2	Environmental Improvement of Urban Slums (EIUS)	AMC	-
3	Urban Community Development Programme (UCD)	AMC	-
4	Urban Basic Services for the Poor (UBSP)	AMC	-
5	Slum Improvement Partnership (SIP)		Comprehensive upgradation through improved health, education, skills upgrading, access to financial mechanisms and physical infrastructure.
6	<i>Deen Dayal Upadhyay Antodyaya Yojana</i> (also known as Slum Networking Programme or <i>Parivartan</i> )	AMC	Upgrading/ improving infrastructure in slums in partnership with local residents, NGOs, private sector, etc. alongwith integration of the slums with the city's infrastructure within a finite period.
7	500 NOC Scheme	AMC	

Source: (Bhatt, 2003)

Despite various efforts in the past, the results achieved could not fully eliminate completely the municipal services issues in slums. As of December 2011, zone wise break-up of slums in Ahmedabad has been provided in the table below:

Table 14 Zone wise slum population details in Ahmedabad

Zone Name	Total Zone Population	No. of Slums	Slum HHs	Slum Population	Slum % of Total
<b>Old AMC Limit (190 sqkm)</b>					
North	1,012,760	94	17,496	76,632	7.57%
South	988,356	191	45,341	1,98,594	20.09%
East	979,362	54	10,943	47,930	4.89%
West	844,661	137	45,554	1,99,527	23.62%
Central	565,288	112	18,817	82,418	14.58%
<b>Sub Total (Old AMC)</b>	<b>43,90,427</b>	<b>588</b>	<b>1,38,151</b>	<b>6,05,101</b>	<b>13.78%</b>
<b>Newly Merged Areas<sup>1</sup></b>	<b>11,78,268</b>	<b>146</b>	<b>35,000</b>	<b>1,57,500</b>	<b>13.37%</b>
<b>Total</b>	<b>55,68,695</b>	<b>734</b>	<b>1,73,151</b>	<b>7,62,601</b>	

Source: (AMC, 2010) and (AMC, 2012)

Ahmedabad city consists of 734 slums in the city with maximum number of slums in the South Zone closely followed by Newly Merged Areas. Annexure 6 shows the locations of slums in Ahmedabad. It can be observed that South Zone, West Zone and Newly Merged Areas constitute 73 percent of the total slum population. Service provisions to these slums are underway through various ongoing initiatives. As of 1998, 80 percent of slums were on private lands (Bhatt, 2003) as cited in (Mahadevia, 2002). Based on a focussed group discussion (FGD) with Mahila Housing Trust, their representatives provided a close estimate of 75 percent of slums on private lands. As per MHT's study, majority of this land has been sold by original land owners to existing residents on the land. Due to notification of majority of this land for various other uses (primarily green belt) under the development plans prepared by AUDA, none of the land transactions have been registered and hence do not provide clear legibility of titles of these lands. According to MHT, based on past evictions in Ahmedabad, slums on private land are safer (or under lesser fear of forced eviction) than those on government lands.

Apart from tenure issues, slums are plagued with poor infrastructure services. According to an estimate by MHT, 68 to 70 percent of slum households have individual toilets. Many of the households have constructed their toilets through *Nirmal Gujarat Shauchalay Yojana* (NGSY) by Gujarat Municipal Finance Board (GMFB). In the year 2009-10, AMC had targeted constructing 21,000 individual toilets and finished 18,223 at the end of the year, while another 2663 were under construction. AMC targeted constructing 18,772 individual toilets and as of November 2011, only 1,737 were built while the remaining 16,988 were not yet started (GMFB, 2011). While individual toilets are being built under the NGSY, sewerage connections are being provided by AMC under the 500 NOC Scheme. This multiplicity of authorities leads to delays and high inconvenience to slum HHs reducing the overall effectiveness of the efforts. Also, unlike the *Deen Dayal Upadhyay Antodyaya Yojana* (SNP), 500 NOC Scheme does not cater to integrated service provision in slums and is limited to water supply and sewerage connections only.

In addition to the above, inadequate, poor quality and irregularity of water supply have been sighted as other problems. General sanitation conditions in the slums are poor and Door to Door collection

<sup>1</sup> Slum survey work in newly merged areas of AMC is under progress.

service is not practiced by AMC. Instead, AMC's vans come only on main roads (mostly on the edge of the slum or in some cases a distance away from slums) to collect garbage. In the absence of mobilised equivalent of a resident's welfare association/ society, door to door collection is not undertaken and high volume of waste is deposited at community bins. As reported by MHT, many slums do not have paved roads and water retention is a common problem in many areas leading to unsanitary conditions.

**Box 2 Brief of 500 No Objection Certificate (NOC) Scheme, AMC**

**500 No Objection Scheme (NOC) Scheme**

**Provision of Individual Water and Drainage Connections to Slum Households (where titled are unclear) under 500 NOC Scheme – Ahmedabad Municipal Corporation; Case Study**

The scheme, previously known as 500 NOC scheme, was launched in 2002 by the Ahmedabad Municipal Corporation. As the name suggests, the scheme aims at providing slum residents with a No Objection Certificate (NOC) that allows them to apply for legal individual sewage and water connections for their house. "500" relates to the amount the applicant has to pay to get the NOC.

All the households have to fulfil the following criteria:

- 1) The applicant should be residing in a slum dwelling of no more than 40 sq m.
- 2) The applicant should have some type of residence proof, such as ration card, voter ID, or tax or electricity bill or 7/12 *utaro* (Any one)

The individual applies to the zonal office on a form available for INR 10. S/he has to submit a proof of residence along with the form. The zonal office issues an 'inward number' to the applicant. (Alternatively, the NGO delivers the application forms (collected from the office on behalf of the applicant) to the community, collects the INR 10 fee with the completed forms, and INR 1,500/500 for the NOC. The NGO then delivers the documents to the Zonal Office and also pays the form fee amount and receives inward numbers issued by the office to be handed over to the applicant. Meanwhile, the NGO gives the applicant a temporary receipt which gets replaced by the regular one received from the office.)

An officer from Estate Department visits the applicant's residence for verification of the plot size conforming to the eligibility criteria and also prepares a rough plan sketch. (Alternatively, an NGO representative accompanies the official and helps in measurement verification and sketch drawing).

Beneficiaries pay INR 1500/500 to tax department or city civic centre and get NOC receipt. (NGO co-ordinates with Estate Department; they collect a list of beneficiaries and directly pay INR1500/500 to tax department and get an NOC receipt.

After receiving the proof of the payment made, the office arranges to send a photo fig to take picture of the residence along with the applicant holding the 'Inward No.' written on a small slate. This photo fig is then pasted on the bottom of the pink NOC certificate which the applicant gets laminated to ensure its long life. The NOC is delivered to the applicant who can now apply for water-sewer connection, or use it while getting the existing illegal connection legalized.

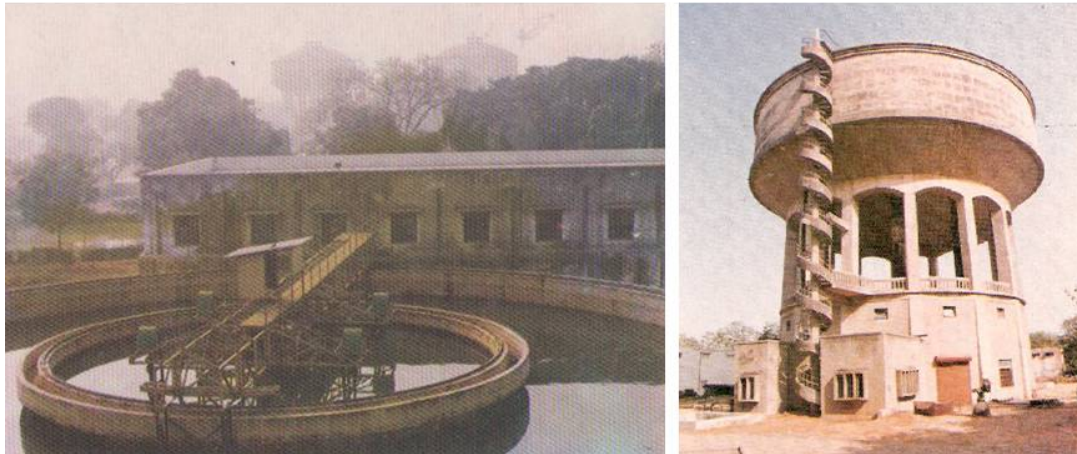
## 6. Sanitation Situation Analysis and Gaps in Services in Ahmedabad

### 6.1. Water Supply

Ahmedabad city is located on the bank of river Sabarmati, having a very old history of providing piped water supply since 1891. In 1950, Dudeshwar water works was constructed on the eastern bank of river Sabarmati sourcing water from the river. Since then, the main source of water supply for Ahmedabad city has been surface water. Dudeshwar water works has been augmented on several occasions. However, River Sabarmati being a non-perennial river resulted into inadequate water availability during dry months.

In late 1950s, the city shifted on ground water sources to cater the demand. During 1970-80, ground water constituted 87 percent of total water supplied by AMC (refer Figure 5). In addition to ease of extraction, compromised catchment of River Sabarmati also played an important role in this shift.

Figure 2 Dudeshwar Water Works



Source: (AMC, Water Supply Profile of Ahmedabad City, 2011)

To augment water supply with surface water sources, Kotarpur water works was constructed sourcing water from River Sabarmati released from Dharoi reservoir. Various augmentations could not keep pace with the increasing demand of the city and hence a gradual shift towards ground water was observed. Between 1975 and 2000, ground water table was reducing by 3 to 4 metres yearly. From the year 1999, release of water from Dharoi reservoir was stopped and Dudeshwar Water Works and 6 French wells in River Sabarmati became non-functional.

**Figure 3 Kotarpur Water Works**



Source: (AMC, Water Supply Profile of Ahmedabad City, 2011)

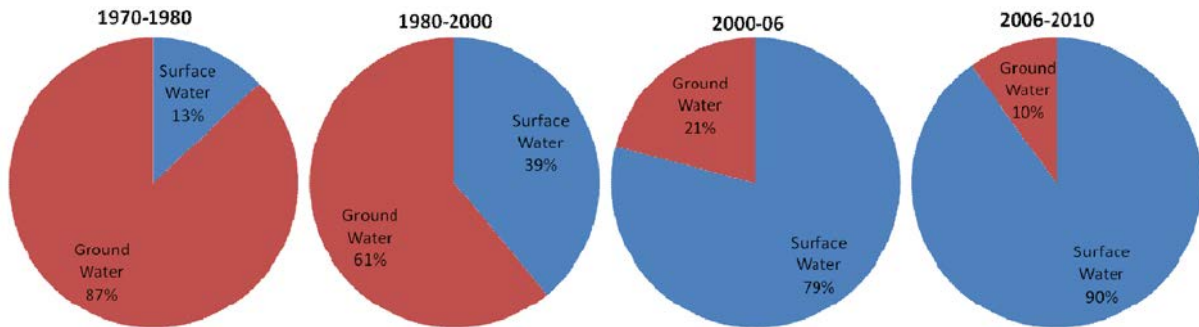
By the year 2000, AMC started sourcing water from Shedhi Branch of Mahi Canal through Raska Wier Water Supply Project bringing water to Kotarpur water works. Additionally, water from Narmada Canal was channelized to River Sabarmati and Dholka Branch of Narmada Canal was used to source water for newer parts of western Ahmedabad. Jaspur Water Works was constructed by 2006-07 to treat water from Dholka Branch.

**Figure 4 Raska Water Works (left & centre); Jaspur Water Works (right)**



Source: (AMC, Water Supply Profile of Ahmedabad City, 2011)

**Figure 5 Share of Ground and Surface Water in Ahmedabad**



Source: (AMC, Water Supply Profile of Ahmedabad City, 2011)

Due to increase in population as well as water demand, this Dudheshwar water works was upgraded by increasing the additional capacity of 45.4 MLD of water by providing six jack wells in the river bed. The city draws 330 MLD water from Narmada Canal commissioned in January 2007. To cater the demand of drinking water to new western part of AUDA, the Dholka branch of Narmada canal was also commissioned to draw 400 MLD. Raska water works has also been augmented with additional



capacity of 200 MLD. Based on the water supply profile prepared by AMC, the future demand of water in Ahmedabad has been tabulated below:

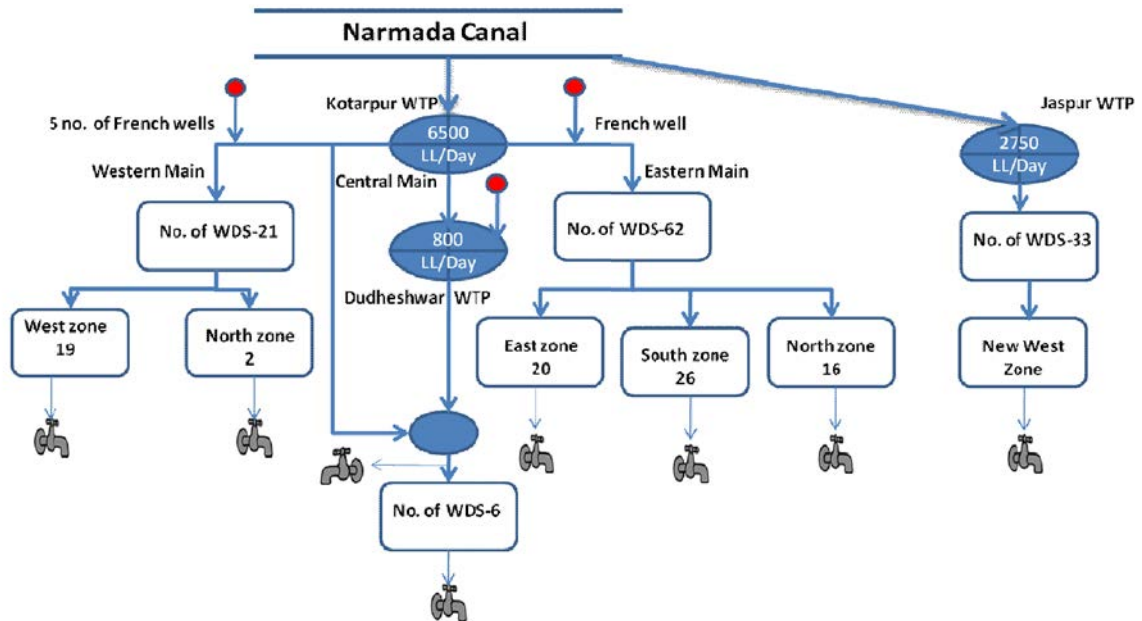
**Table 15 Population and water demand of Ahmedabad city (Urban Agglomeration)**

Year	Population (in Millions)	Demand (In MLD)
1891	0.15	5.50
1901	0.19	18.20
1911	0.22	22.60
1921	0.27	32.00
1931	0.31	61.00
1941	0.59	88.50
1951	0.83	99.00
1961	1.15	209.10
1971	1.59	331.60
1981	2.38	397.50
1991	3.30	528.00
2001	4.42	708.30
2011	5.57	752.00
Projected Population and water demand*		
2021	7.96	1273.30
2031	10.14	1623.00

*Note: \* Population projections as considered in DPR prepared for water supply.*

Source: (AMC, Water Supply Profile of Ahmedabad City, 2011)

**Figure 6 Water Supply System of Ahmedabad Municipal Corporation**



Source: UMC.

A summary of various sources of water for Ahmedabad have been tabulated below:

**Table 16 Capacity of Sources of Water Supply (2011)**

Source of water	2011 (In MLD)
Raska	200
Narmada Canal	330
Intake well 1&2	495
Dudheshwar water works	70
Jaspur water treatment plant	275
Frenchwell (7 No.)	200
Bore wells (532 No.)	280
<b>Total</b>	<b>1850</b>

Source: (AMC, 2012)

### Water Treatment Plants

AMC has existing four water treatment plants with the designed capacity of 1620 MLD. Currently 1220 MLD is sourced while 950 MLD is treated and supplied on regular basis against a demand of 835 MLD. The details of water treatment plants are as mentioned below.

**Table 17 Water Treatment Plant Capacities (2011)**

Water Treatment Plant	Capacity (In MLD)	Actually treated (In MLD)
Kotarpur WTP	715	550
French Wells	75	75
Dudheshwar WTP	70	25
Jaspur WTP	275	190
Raska WTP	200	110
<b>TOTAL</b>	<b>1620</b>	<b>950</b>

Source: (AMC, 2012)

### Water Distribution System (WDS)

Ahmedabad Municipal Corporation has 139 water distribution stations across the city. There are six distribution zones, overlapping with the administrative zones. The distribution network of 3500 km covers entire city. The length of trunk main line is about 230 km. The average daily supply of water is around 1030 MLD. The average litre per capita per day (lpcd) is estimated around 148 LPCD. The coverage of water supply connection is reported to be 88.3 percent<sup>2</sup>. The daily supply of water at consumer end is 2.25 Hrs on fixed time.

<sup>2</sup> As reported by AMC, there are 11,22,160 residential water connection against 12,71,392.

### Quality of Water Supply

During the year 2011-12 (till Dec) numerous water quality tests were conducted at various locations of water supply chain. The table below gives details of number of samples taken from various locations for different types of tests.

**Table 18 Water Quality Tests for Municipal Water Supply, Ahmedabad**

	WTP	Intermediate Points	Consumer End	Total Samples Tested	Passed	Percentage
Residual Chlorine - No. of Samples	6,975	-	44,340	51,315	49,262	96.0%
Physical/Chemical - No. of Samples	-	-	-	-	-	-
Bacteriological - No. of Samples	6,975	-	44,340	51,315	50,397	98.2%
Total Number of Samples for all types of tests				1,02,630	98,633	96.1%

Source: (AMC, 2012)

### Service Level Benchmarking (SLB)

There are 9 key performance indicators developed for water supply system under SLB initiative. The details of indicators for AMC in Dec-2011 are given below in comparison with 2010-11.

**Table 19 Performance Indicators and its comparison with Benchmarks**

S. No.	Performance Indicator	Benchmark *	2010-11	2011-12 (till Dec)
1	Coverage of water supply connections	100%	90%	92%
2	Per capita supply of water	135 lpcd	140 lpcd	147 lpcd
3	Extent of metering of water connection	100%	0 %	NA
4	Extent of Non Revenue Water (NRW)	20%	26%	20%
5	Continuity of water supply	24*7	2.25 Hrs Daily	2.25 Hrs Daily
6	Quality of water supplied	100%	99%	99.5%
7	Efficiency in redressal of customer complaints	80%	99%	99%
8	Cost recovery in water supply services	100%	78%	82%
9	Efficiency in collection of water supply related charges	90%	81%	82%

Source: (AMC, 2012); Comparison done by UMC.

## 6.2. Waste Water

Efforts to provide an underground sewer system in Ahmedabad city, dates back to 1890, by Rao Bahadur Ranchhodlal Chhotalal<sup>3</sup> - the then President of the Municipality. Gradually, by the end of the year 1930, the entire walled city was covered by sewerage network and by the year 1958, complete area under AMC was equipped with an underground sewerage system (AMC, Sewerage Profile of Ahmedabad City, 2011). Annexure 2 shows the growth of sewerage network in Ahmedabad city since 1890.

Most of the sewage generated on the eastern part of the city was conveyed to 4 major terminal sewage pumping stations viz. Jamalpur, New Suburban, Maninagar and new Behrampura. From all these 4 terminal sewage pumping stations, the sewage was conveyed to the stabilization ponds at Pirana, for primary treatment. A major portion of untreated sewage was discharged either on land or directly into river Sabarmati until the year 1952. AMC took the cognizance of this problem and subsequently, commissioned Pirana Sewage Treatment Plant of 324 MLD capacity in the year 1975.

In the Western part of city, the sewage system was completed in the year 1955. The sewage was drained to the old Vasana sewage pumping station; from where, it was taken to 280 hectares of area of Vasana Sewage Farm. A part of the sewage remained untreated and was discharged directly into the river. Vasana Sewage Treatment Plant with a capacity of 54 MLD was subsequently commissioned in the year 1980 to treat all sewage collected from west Ahmedabad.

The remainder of this section analyses the sewerage system in Ahmedabad based on the various stages with specific issues as well gaps projected till 2021. This is followed by proposals under this CSP to fulfil any existing gaps as well as provide basic minimum services in sewerage to the city for the future. This section is structured as below:

- i. Sewage Generation
- ii. Sewage Collection (Slums and other areas)
- iii. Sewage Treatment
- iv. Reuse and Recycle of Treated Water
- v. Staffing and Management
- vi. Existing and Projected Gaps, and Issues
- vii. Ongoing initiatives and Proposals under this CSP for improving Sewerage Services

### 6.2.1. Sewage Generation

Waste water generation in Ahmedabad as of December 2011 has been computed in Table 20. According to the estimate, a total of 1220 MLD water is supplied from the various facilities in Ahmedabad, out of which around 20 percent is lost as Non Revenue Water (NRW). Hence, effective supply of water reaching the consumers is estimated to be 950 MLD. Approximately, 80 percent of actual water received at the consumer end comes back as sewage. Hence the sewerage generation in Ahmedabad is estimated to be 802 MLD.

<sup>3</sup> Ranchhodlal Chhotalal was a well known mill owner in Ahmedabad who became the President of Ahmedabad Municipality in 1885. He was responsible for design and implementation of underground sewerage system in Ahmedabad.

**Table 20 Volume of Drinking Water Consumed and Sewage Generated (Mar-12)**

S. No.	Type of Connected Property	Unit	Drinking Water Consumed			Sewage Generated
			ULB Water Supply	Other Sources	Total	
1	Residential	MLD	1,073.60	NA	836.00	705.76
2	Public taps	MLD	109.80	NA	85.50	72.18
3	Commercial	MLD	36.60	NA	28.50	24.06
4	Industrial	MLD	-	NA	-	-
5	Institutional	MLD	-	NA	-	-
6	Bulk Supply	MLD	-	NA	-	-
7	Other	MLD	-	NA	-	-
<b>Total</b>		<b>MLD</b>	<b>1,220</b>	<b>-</b>	<b>950</b>	<b>802</b>

Source: (AMC, 2012)

In the above computation of sewage generation, water sourced from sources other than municipal supply (such as water used from private bores) have not been estimated since no such survey has been conducted<sup>4</sup>. Nevertheless, as AMC has a total sewage treatment capacity at of 1075 MLD (153 percent of existing sewage generation) at various installations, and any additional sewage generated can be treated. As of March 2012, only 720 MLD was effectively operational.

### 6.2.2. Sewage Collection Network

Ahmedabad was amongst the first few cities to have planned and implemented underground sewerage collection system during 1880s after careful study of sanitation systems in Calcutta, Lahore, Glasgow and London<sup>5</sup> (Yagnik & Sheth, 2011).

As of December 2011, 85% of the city's area (around 396 sqkm) is covered by sewerage network, whereas 90% of the residential properties in AMC have access to the city's sewer network. The table below provides a summary of the sewerage network in Ahmedabad municipal area. At present, there is 2172 km of sewerage network in the city. As of March 2012, around 233 km of network has been recently installed in East Zone while, another 407 km length of network has been implemented in New West Zone. Work is ongoing for another 74 km of network in New West Zone.

**Table 21 Sewerage Network Coverage in AMC**

Sewerage Network	Unit	Dec-2011
Existing Length of sewerage network pipes	Kilometres	2172
Proposed/Ongoing Network	Kilometres	74
<b>Total area covered by sewerage network</b>	<b>Sqkm</b>	<b>396</b>

Source: (AMC, 2012)

Overall, Ahmedabad city has 81 percent of all properties connected to sewer network, while remaining are either disposing their sewage through septic tanks, soak pits open drains or resort to open defecation. The table below provides a break of all properties based on their sewage disposal methods.

<sup>4</sup> As water supply network in newly expanded AMC jurisdiction is being laid, alternate source of water like bore wells would be eliminated eventually.

<sup>5</sup> Meticulous studies were conducted including analysis of household habits, quantities of urine and solid waste per head, volume studies, kitchen and bathing waste water, waste from cattle and other human waste.

Table 22 Total Sanitation Coverage at the city level, 2011

Type of Property	Unit	Number of Properties with access to Toilets						No access to toilets	Total Number of Properties
		Toilets connected to				In Private Layouts	Community Toilets		
		Sewers	Soak pits	Septic tanks	Drains				
Residential	No.	11,63,779	-	90,700	-	-	-	12,54,479	
Commercial	No.	93,165	-	-	9,045	-	-	3,01,506	
Industrial	No.	Not in purview of AMC. Industrial areas have a separate CETP system.							
Institutional	No.	14,661	-	-	-	-	-	14,661	
Other	No.	Not available.							
<b>Total</b>	<b>No.</b>	<b>12,71,606</b>	<b>-</b>	<b>90,700</b>	<b>9,045</b>	<b>-</b>	<b>-</b>	<b>16,40,316</b>	

Source: (AMC, 2012)

According to AMC, all government institutions are connected to sewer (as per the table below).

Table 23 Zone wise Sanitation Arrangement of Government Institutions

Zone Name	Connected to Sewer	Septic tank	Soak away Pits - two-pit	Soak away Pits - single pit	Pits - draining into Nala/ water body	Service Latrines (Manually Cleaned)	No access to toilets	Total Number of Institutional Properties
North	73	-	-	-	-	-	-	73
South	70	-	-	-	-	-	-	70
East	69	-	-	-	-	-	-	69
West	335	-	-	-	-	-	-	335
Central	475	-	-	-	-	-	-	475
New West	197	-	-	-	-	-	-	197
<b>Total</b>	<b>1,219</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,219</b>

Source: (AMC, 2012)

According to AMC, all municipal schools are connected to sewers. However, when a quick visit to some of the schools was undertaken, toilets in the municipal schools were found to be in unusable state due to lack of maintenance, choked connections to sewer lines, unfriendly design for use by children and irregular water supply. The sanitation in municipal schools has been of some concern and requires attention. The taps and other fixtures from the schools, have been stolen leading to unusable toilets. In situations where it is used, it causes inconvenience to users and makes cleaning and maintenance difficult.

Table 24 Sanitation Arrangement of Educational Institutions in Ahmedabad

Type of school	No.	Sanitation arrangements						Disposal **
		Boys		Girls		Staff		
		Toilets	Urinals	Toilets	Urinals	Toilets	Urinals	
Municipal Schools **	225	557	-	593	-	NA	NA	<b>All connected to sewer **</b>
All other colleges *	170	100%						

Source: \* (Gujarat University, 2012); and \*\* (AMC, 2012)

As of 2011, 100 percent of registered residential properties in Ahmedabad have an individual toilet and 93 percent are connected to sewer network. In Central and West zone, the network coverage is 100 percent for residential properties. As peripheral areas are being urbanised, the network is being

expanded in these areas. Annexure 4 shows a map of the existing sewerage network in Ahmedabad. A zone wise sewage disposal of residential properties in Ahmedabad has been shown in the table below:

**Table 25 Zone wise Sanitation Arrangement of Residential Properties in Ahmedabad**

Zone Name	Connected to Sewer	Septic tank	Soak away Pits - two-pit	Soak away Pits - single pit	Pits draining into Nala/ water body	Service Latrines (Manually Cleaned)	No Access to Toilets	Total
North	1,94,396	21,600	-	-	-	-	-	<b>2,15,995</b>
South	1,83,351	20,372	-	-	-	-	-	<b>2,03,723</b>
East	1,80,110	20,012	-	-	-	-	-	<b>2,00,122</b>
West	2,13,759	-	-	-	-	-	-	<b>2,13,759</b>
Central	1,33,723	-	-	-	-	-	-	<b>1,33,723</b>
New West	2,58,441	28,716	-	-	-	-	-	<b>2,87,157</b>
<b>Total</b>	<b>11,63,779</b>	<b>90,700</b>	-	-	-	-	-	<b>12,54,479</b>

Source: (AMC, 2012)

### Sewage Collection Network in Slums

Out of a total of 1.73 lakh households in slum areas, around 2/3<sup>rd</sup> of HHs have individual toilet. Of the slum HHs with individual toilets, around 90 percent are connected directly to sewers while the remaining dispose sewage in septic tanks, soak pits and nalas/water bodies. Around 13.5 percent or 23,000 slum households are dependent of public and/or pay & use toilets in the city.

**Figure 7 Individual Toilets and Water Connection in Slums of Ahmedabad**



Source: UMC.

AMC has recently conducted a biometric survey across the slums in the city. However, as the survey is in progress, complete data is unavailable for Newly Merged Areas. Based on this survey, access of slum households to sewerage network have been shown in the table below:

**Table 26 Access to Sewage Collection Network in Slum Areas**

Zone	Total no. of HHs *	Estimated number of Slum Households with sanitation arrangements					Sub Total	Communi-ty & Pay Toilets	Number of HHs with access to individual or public toilet
		Connecti-on to Sewer	Septic tank	Soak away Pits	Pits - draining into Nala/ water body				
North	17,496	11,985	200	266	866	13,317	2,415	15,732	
South	45,341	26,921	449	598	1,944	29,912	6,950	36,862	
East	10,943	7,106	118	158	513	7,896	3,967	11,863	
West	45,554	26,465	441	588	1,911	29,405	5,692	35,097	
Central	18,817	10,385	173	231	750	11,539	3,525	15,064	
Newly Merged Areas	35,000	22,050	368	490	1,593	24,500	933	25,433	
<b>Total</b>	<b>1,73,151</b>	<b>1,04,912</b>	<b>1,749</b>	<b>2,331</b>	<b>7,577</b>	<b>1,16,569</b>	<b>23,482</b>	<b>1,40,051</b>	

Source: (AMC, 2010); and (AMC, 2012)

### Sewage Collection Network Maintenance

The sewage collection system was designed to cater to most parts of the walled city. The original system designed to be adequately ventilated and carry only sewage, had provisions for vent shafts at every 4 metres. Over the years, more than 80 percent of these vent shafts have disappeared (KSSM, 2006). This leaves the system ill-ventilated and causes potential hazard for cleaning staff. Despite the orders by the Gujarat High Court's order in 2006 against manhole workers entering the sewers, manual cleaning of sewers is undertaken due to ineffectiveness and inaccessibility of large super sucker machines in narrow lanes, especially in the walled city (KSSM, 2006). A total of 53 rickshaw mounted grab bucket machines in the city are highly insufficient for cleaning narrow lanes which are inaccessible by large vehicles. Zone wise details of the rickshaws have been provided in Table 28.

Over the years, due to increase in population, irregular maintenance, uncontrolled disposal of other waste in the sewerage network and wearing of the network, the capacity has been severely affected. To add to it, unofficial and unscientific cross connections between the sewer network and storm water drainage were made at various locations based on local complaints received by AMC (Tam, 2011). AMC maintains a fleet of vehicles for cleaning of sewage collection network including the following:

**Table 27 Sewerage Machines and Equipments with AMC**

Type of Machine	No. of Machines
Super Sucker	4
Combined Machine	18
Jetting Machine	3
Gulley Emptier	4
High Flow Jetting	2
Gulley Emptier on Hire	10
Rickshaw Mounted Grab Bucket Machine	53

Source: (AMC, 2012)



Although the number of machines for maintenance of sewers seems sufficient, accessibility of narrow lanes and streets, especially in the walled city have been a problem and hence, manual cleaning was observed earlier. With a ban enforced on manual cleaning of manholes, AMC provided rickshaw mounted grab bucket machines to workers who were earlier engaged in manual manhole cleaning, most of them belonging to *Valmiki* community. A break-up of rickshaw mounted machines by ownership has been provided in the table below:

**Table 28 Details of Rickshaw Mounted Grab Bucket Machines used for Sewer Management in Ahmedabad**

Zone	No. of Rickshaw Mounted Grab Bucket Machines	
	With AMC	Provided by AMC to manhole workers <sup>6</sup>
NWZ	2	10
CZ	3	8
NZ	3	6
WZ	3	1
SZ	2	4
EZ	5	6
<b>Total</b>	<b>18</b>	<b>35</b>

Source: (AMC, 2012)

### 6.2.3. Sewage Treatment

As indicated earlier, Ahmedabad generates about 802 MLD of sewage out of which around 720 MLD is collected through piped sewer network amounting to 90 percent collection. The entire sewage collected gets treated at the various STPs. While sewer network takes up 720 MLD, 92,654 septic tanks and 2,606 soak pits take up an estimated 50 MLD leaving the remaining 32 MLD which is disposed untreated in the city.

**Table 29 Waste Water disposal in Ahmedabad**

Description	Dec-11	Unit
Waste Water Generated	802	MLD
Waste Water Collected by Sewer Network	720	MLD
Waste Water Collected by Septic Tanks & Soak Pits	50	MLD
Waste Water Disposed untreated	32	MLD

Source: (AMC, 2012)

The table below shows the installed and operating capacities of various STP installations in Ahmedabad.

**Table 30 Volume of Wastewater Collection (As of Dec-11)**

S. No.	Name of STP	Unit	Installed Capacity	Sewage Volume Treated	
				Secondary Treatment	Proposed Tertiary Treatment*
1	Pirana STP - UASB Based	MLD	106.00	106.00	Enviro Associate
2	Pirana STP - Lagoon Based	MLD	182.00	45.00	Upgradation under NRCP Ph-II
3	Pirana STP - ASP Based	MLD	180.00	180.00	Doshion Veolia
4	Pirana STP - ASP Based	MLD	60.00	60.00	Enviro Associate

<sup>6</sup> Rickshaw mounted grab bucket machines have been provided to Valmiki Samaaj to retain their employment.

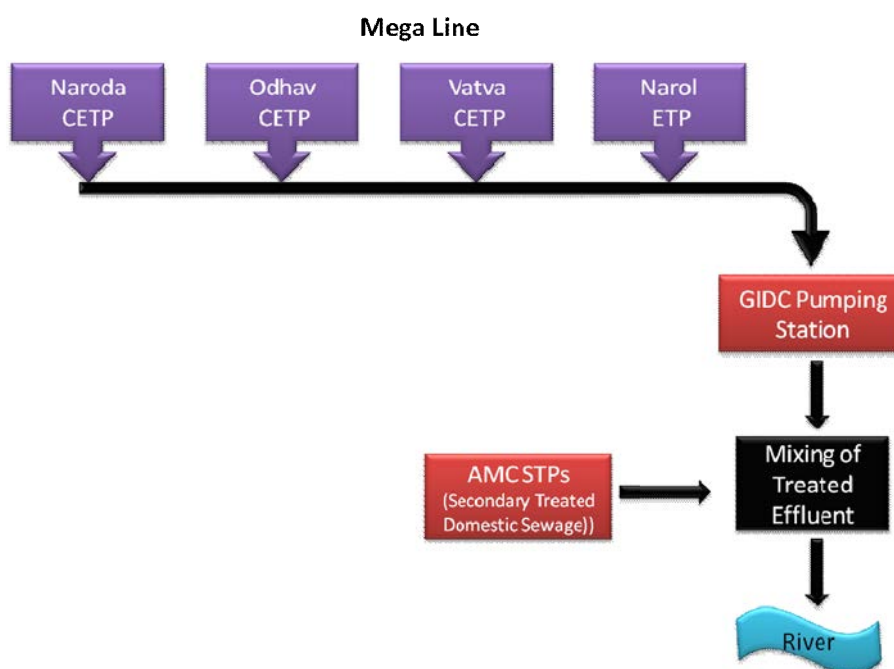
5	Vasna STP - UASB Based	MLD	126.00	126.00	Essel Infra
6	Vasna STP - Lagoon Based	MLD	76.00	58.00	Upgradation under NRCP Ph-II
7	Vasna STP - ASP Based	MLD	35.00	35.00	-
8	Vasna STP - ASP Based	MLD	240.00	45.00	No treatment
9	Vinzol STP	MLD	70.00	40.00	JITF
<b>Total **</b>		<b>MLD</b>	<b>1,075.00</b>	<b>720.00</b>	
10	Kamon STP (proposed)	MLD	As required	0.00	-
11	Vanzar STP (proposed)	MLD	As required	0.00	-

Note: \* MOUs have been signed by AMC with private consultants to conduct tertiary treatment at various STPs.  
\*\* Current operational capacity reported by AMC is 720 MLD (AMC, Sabarmati River Cleaning Project, 2012)

Source: (AMC, 2012)

AMC has nine existing sewage treatment plants with a total installed capacity of 1075 MLD at Pirana, Vasana and a new STP at Vinzol. Another 2 are under planning at Kamon and Vanzar. Common effluent treatment plants (CETP) have been installed by the highly polluting industries in Odhav, Naroda, Vatva and Narol GIDC estates. The treated effluent from CETP is carried by a 'Mega Line' and is mixed with the treated sewage from STP at Pirana so as to lower the concentration of S.S. and then discharged into river Sabarmati. A 27 km long mega pipe line has been laid from Naroda to Pirana conveying this treated effluent of CETPs located at Naroda, Odhav, Vatva & industries of Narol-Shahwadi. The figure below shows a diagram of the mega line and industrial estates connected with it for effluent treatment facilities for industries in Ahmedabad.

Figure 8 Dedicated Industrial Effluent Treatment System in Ahmedabad



Source: (AMC, 2012); Diagram developed by UMC.

Presently, AMC conducts secondary treatment of sewage. AMC has signed MOUs under the Vibrant Gujarat Summit with various private consultants for conducting tertiary treatment of sewage prior to reuse and recycling of sewage.

## Sewage Quality

AMC regularly conducts testing of the waste water effluents. In 2010-11, 85% of the samples tested passed the tests as per CPHEEO norms. As per the latest data from March to December 2011, around 49 samples out of 251 failed the tests. Improvements from secondary to tertiary treatment of sewage would ensure 100 percent achievement of quality tests.

**Table 31 Quality of Waste Water Treatment**

Discharge compliance after secondary treatment		Tested	Passed	% Passed
Treated effluent samples, 2008-09	Number/year	504	378	75 %
Treated effluent samples, 2010-11	Number/year	283	241	85 %
Treated effluent samples, till Mar-2011 to Dec-11	Number/year	251	225	90 %

Source: (AMC, 2012)

Overall, the number of samples tested has reduced significantly from over 500 samples in 2008-09 to less than 300 samples in 2010-11. As per AMC, outlet of treated waste water in Ahmedabad is integrated with waste water outlet of GIDC (covering 4 industrial estates of Naroda, Narol, Odhav and Vatva). Any lapses in treatment reflect on poor quality of treated waste water of AMC. This was cited as the primary reason for failure of around 10 percent of tests conducted since March 2011 (Refer Figure 8).

Effectiveness of industrial CETPs is a serious concern as raised by the CAG Report for Gujarat, March 2012. A news article cites the CAG report saying that all four CETPs of Ahmedabad are not complying with norms. The table below shows the quality of treatment undertaken by various CEPTs in Ahmedabad.

**Table 32 Testing of Effluent Treatment Effectiveness of CETPs in Ahmedabad**

CETPs	BOD	COD	NH <sub>3</sub>	Oil	TDS
<b>GPCB Norms</b>	<b>30</b>	<b>250</b>	<b>50</b>	<b>10</b>	<b>2100</b>
Narol	195	414	15	1	3566
Naroda	490	1493	246	14.2	15614
Odhav	775	1408	900	12.4	5616
Vatva	570	1036	128	11.4	18528

*BD – Biological oxygen demand; COD – Chemical oxygen demand; TDS – Total dissolved salts; NH<sub>3</sub> – Ammonia.*

Source: (TNN, You are living in toxic Ahmedabad, 2012)

Similarly, tests conducted by GPCB reveal failure of samples taken from River Sabarmati at entry and exit points namely Hansol Bridge and Maroli Pumping respectively. The table below shows the results of test conducted by GPCB and cited by CAG Report, 2012.

**Table 33 Results of tests conducted by GPCB at entry and exit points of River Sabarmati in Ahmedabad**

BOD	30	5	87
Fecal Coliform	500	23	4300
Total Coliform	5000	93	24000

*BD – Biological oxygen demand.*

Source: (TNN, You are living in toxic Ahmedabad, 2012)

Figure 9 Polluted River Sabarmati near Vishala Bridge



Source: (TNN, CAG Diagnosis: 'Bimaru' Gujarat, 2012)

### Septage Management

AUDA has prepared detailed project report (DPR) for expansion of sewerage network in western and eastern extensions of Ahmedabad city. The sewerage DPR has been prepared keeping in mind the needs of the city till 2040 AD. Most of the areas in the newly merged areas of AMC did not have underground sewerage network and hence there was enormous dependence on septic tanks. With implementation of the DPR, existing septic tanks can be connected to the sewerage network and gradually septage management could be phased out. However, until successful completion and achieving 100 percent coverage by sewerage network, septage management for the following need to be done.

Table 34 Number of septic tanks, soak-away pits and pits draining into nalas/ water-bodies

Description	No. of Septic Tanks	No. of soak-away pits	No. of pits training into nalas/ water bodies	Total
Residential Properties	90,700	0	0	<b>90,700</b>
Commercial Properties	0	0	9,045	<b>9,045</b>
Slum households	1,749	2,331	7,577	<b>11,657</b>
<b>Total</b>	<b>92,449</b>	<b>2,331</b>	<b>16,622</b>	

Source: (AMC, 2012)

AMC is equipped with 53 septage handling machines and can hire around 10 more from private contractors on need basis. All dry sludge collected from the septic tanks is transported to Gyaspur scientific landfill site while wet waste is taken for treatment to STPs. AMC charges INR 225/- per trip for cleaning of septic tanks within their limits. It also seen that, AMC often has a backlog of requests due to which private operators charge more and supply this to nearby farms as nutrient manure. A summary of septic tank cleaning requests has been provided in the table below:

Table 35 Average Number of requests received by AMC for Septic Tanks Cleaning

Zone	Number of requests per month
North	30
South	30
East	140
West	0
Central	0
New West	200
<b>Total</b>	<b>400</b>

Source: (AMC, 2012)

With a total of 92,654 septic tanks in the city, CPHEEO manual recommends cleaning of a domestic septic tank atleast once in 2 years. However, in practice many septic tanks are cleaned at an interval of 2 to 5 years. Recognising the importance of septage management as an intermediate solution, a quick assessment reveals that 46,327 tanks would need to be cleaned in the next one year (by 2012-13), by which complete sewerage network would be implemented. With 39 septage sucking machines owned by AMC, each machine can attend 4 calls daily. Hence, in a year Ahmedabad need 32 septage sucking machines to clean around 46,000 tanks. Since AMC owns 39 machines, there is no infrastructural gap for septage management in the city.

#### 6.2.4. Reuse, Recycling and Disposal of Treated Sewage

AMC has recently initiated reuse of treated sewage to support an urban forestry initiative. About 0.63 ML of water (0.1% of sewage treated) is used for watering the gardens and urban forests.

Also, under the auspices of Vibrant Gujarat 2011, AMC had requested proposals from organisations to set up a sewage reuse and recycling units. Four organisations have displayed their interest and the Municipal Corporation is currently in a discussion to finalise. The proposed projects are as follows:

- Essel Infra Projects Ltd. for 126 & 35 MLD STP at Vasana site
- JITF water Infrastructure Ltd. (Jindal) for 75 MLD STP at Vinzol site
- Doshion Ltd. for 180 MLD at Pirana site
- Enviro Associate Pvt. Ltd. for 106 MLD and 60 MLD STP at Pirana

The Corporation has also received proposals for waste-energy project for generating gas from sewage at Pirana.

#### 6.2.5. Staff and Management

AMC has a total staff of around 15,000. Details staff exclusive of sewerage department is not available as sharing of resources is a common practice for inter sectoral management of services. The table below shows the class wise staff composition of AMC.

Table 36 Staff and Management of AMC, 2011

S. No.	Type of Staff	Unit	Technical	Non-technical
1	Class I	Number	212	38
2	Class II	Number	637	110
3	Class III	Number	4,028	1,166
4	Class IV	Number	4,600	13,770
5	Other	Number	NA	NA
6	Contracted Staff	Number	NA	NA
<b>Total</b>		<b>Number</b>	<b>9,477</b>	<b>15,084</b>

Source: (AMC, 2012)

### 6.2.6. Service Level Benchmarking (SLB) and Gaps in Sewerage Services

There are 8 key performance indicators developed for sewerage system under SLB initiative. The details of indicators for AMC in Dec-2011 are given below.

**Table 37 Performance Indicators and its comparison with Benchmarks**

Performance Indicator	Benchmark	2011-12
Coverage of individual toilets	100 %	82 %
Sewage Coverage by Connections	100%	82 %
Sewage Collection by network	100%	95 %
Sewage Treatment Capacity	100%	134.0 %
Extent of Reuse & Recycle of Sewage **	20%	0.10 %
Quality of Sewage Treatment	100%	90 %
Efficiency in Redressal of Consumer Complaints	80%	99 %
Extent of Cost Recovery in Sewage Management	90%	83 %
Efficiency in collection of sewage charges	90%	83 %

Source: (AMC, 2012)

Based on the infrastructural provisions and service delivery records maintained by AMC, existing and proposed absolute gaps in the same for sewerage services have been summarised below:

#### Projected Gaps

Based on the projected population, a proportionate increase in demand can be computed as below:

**Table 38 Existing and Projected Incremental Gaps in Sewerage Services**

Waste Water			2011	2016	2021	Unit
	Existing Demand	Existing Delivery	Gap	Gap	Gap	
Sewerage Network Length	2,976	2,246	730	1,225	1,802	Km
Sewage Connections (total)	15,74,060	12,71,606	3,02,454	5,64,053	8,69,128	No. of Connections
Sewage Connections (slum)*	1,73,151	1,04,912	62,979	62,979	62,979	No. of Connections
Sewage Collection	802	682	120	236	389	MLD
Sewage Treatment Capacity	802	577	225	341	494	MLD
Extent of Reuse & Recycle of Sewage	160	0.58	160	183	214	MLD
Vehicles for Septage Management	32	39	-	-	-	No.

*Note: Population projections done by AMC (at 2016 and 2021 are 64.94 lakh and 75.73 lakh) have been adopted for projected gaps assessment.  
\* Gap projected for 2016 and 2021 is the same as 2011 as no increments in slums would occur as planned by various slum improvement schemes.*

Source: UMC.

Ahmedabad generates around 802 MLD of sewerage daily. Around 32 MLD of sewage is drained untreated into natural drains, storm water drains, lakes, agricultural fields and other open areas. Of the remaining, 720 MLD of sewage is collected and treated by AMC at various STPs prior to discharge in River Sabarmati. Another 50 MLD is collected and disposed using septic tanks and soak pits. A quality test revealed failure of 10 percent of samples tested for quality between April and March 2011 at the discharge points from STPs.

Ahmedabad city has a total of 15.74 lakh registered properties (excluding industries), while the number of sewer connections is 12.71 lakh. Around 3 lakh properties of various uses are not connected to piped sewerage network. Residential coverage of sewer connections by number of residential connections was found to be 92.8 percent with 11.64 lakh connections against 12.55 lakh registered residential properties. AMC reports coverage of sewer network by connections in slum areas to be 64.3 percent enumerating to 1.17 lakh sewerage connections in slum areas out of a total of 1.82 lakh households. Industrial estates have a separate Mega Line for collection and treatment of sewage generated in the industries through an exclusive CETP installation (refer Figure 8).

Recycling and reuse of treated water should be improved to by 213.5 MLD till 2021 to achieve 20 percent target set by MoUD. In addition to recycling and reuse, qualitative issues have been identified in the following section.

### 6.2.7. Issues in Sewerage Services

The key issues identified in sewerage services are as follows:

- All residential properties in Ahmedabad are equipped with individual toilets as per AMC's database but coverage of individual toilets in slums is 71.5 percent.
- While all residential properties with individual toilets are connected to sewer network, number of connections to sewer network in slum areas is only 64.35 percent of the total slum households.
- In residential properties, 7.2 percent of properties are still using septic tanks for disposing sewage.
- Recycle and reuse of treated sewage is restricted to urban forestry in the vicinity of STPs without wider use of the treated water. However, AMC has planned reuse of 550 MLD of industrial grade treated water reducing fresh water demand in industries.
- Despite excess capacity to treat sewage, only 90 percent of total sewage is being treated. Around 32 MLD is being discharged untreated
- Around 10 percent of samples of treated sewage failed the quality tests. As per AMC, GIDC's treated sewage is mixed with AMC's treated water prior to discharge in River Sabarmati (Refer Table 31). Any deficiencies in treating done by GIDC results in failure of quality test for combined discharge point.
- Due to unofficial and unscientific cross linkages between SWD and sewerage, sewage is getting channelized into water bodies including River Sabarmati (Tam, 2011).
- Despite various efforts taken by AMC to conserve River Sabarmati under the NRCP, the CAG Report of Gujarat published in March 2012 reports the efforts as a failure<sup>7</sup>. Industrial effluents are also being disposed untreated in River Sabarmati due to non compliance of CETPs with GPCB norms<sup>8</sup>. As per AMC, the final disposal of treated sewage is mixed with industrial effluents from GIDC which do not match GPCB norms resulting in failure of quality tests for samples taken from the combined discharge point.
- Domestic sewage is reportedly being discharged through cross connections in storm water drainage apart from illegal pipelines draining sewage directly into the river (Ibid).

<sup>7</sup> (TNN, CAG Smells a Rat, 2012)

<sup>8</sup> (TNN, You are living in toxic Ahmedabad, 2012)

## 6.2.8. Proposals of City Sanitation Plan for Sewerage Services

### Ongoing Initiatives

AUDA prepared a detailed project report (DPR) for expansion of sewerage network in western and eastern extensions of Ahmedabad city. The sewerage DPR has been prepared keeping in mind the needs of the city till 2040 AD. Hence, subject to complete implementation of the works proposed in the DPR, the city would not face infrastructural gaps in sewerage treatment capacity. The proposals are under implementation by AMC including provision of collection network and augmentation of sewage treatment capacity of AMC.

**Table 39 Ongoing improvements in Sewerage System**

S. No.	Proposed Augmentation	Number	Unit	Completion by (Year)
1	Sewage Collection Network	714	Km	December 2012
2	Sewage Treatment Capacity	700	MLD	After approval of NRCP Ph-II

Source: (AUDA, Detailed Project Report on Sewerage Network of East & West AUDA Areas of Ahmedabad (Gujarat) under JN-NURM Programme, n.d.)

### Recommendations of City Sanitation Plan

While augmentation of sewer network would ensure coverage of all inhabited areas in the city, drives would be required to provide connections to households currently dependent on septic tanks. Sewerage network augmentation is estimated to be completed by 2012-13. Considering potential delays in achieving 100 percent connections, septage management should be strengthened as an intermediate measure to ensure sanitation in the city.

Around 8.69 lakh new connections need to be provided as the city grows adding 389 ML sewage daily. In addition of residential coverage, efforts would be required to provide connections in slum areas where septic tanks and soak pits are being used as alternative disposal mechanisms. The table below summarises the recommendations by CSP for improving sewerage services:

**Table 40 Infrastructure Works Proposed under CSP for Sewerage Services until 2021**

S. No.	Description	Proposed Improvement		Unit	Block Cost (INR in lakh)
		2016	2021		
1	Refurbishment of existing sewerage network (@ 15% of existing network)	337	-	Km	12,516
2	Provision of sewerage connections	5,64,053	3,05,075	No. of Connections	Cost to be borne by user
3	Provision of sewerage connections in slums	62,979	-	No. of Connections	Cost to be borne by user
				<b>Total</b>	<b>INR 12,516 lakh</b>



In addition to infrastructural improvements shown above, the city needs other initiatives to improve sewerage services in the city as listed below:

**Table 41 Studies and Programmes Proposed under CSP for Sewerage Services until 2021**

Component	Description	Quantity	Unit	Block Cost (INR in lakh)
<b>DPR Preparation</b>	Preparation of DPR for refurbishment of sewerage network proposed under this CSP	1	No.	50.0
<b>GIS Database preparation</b>	Preparation of GIS Database for Sewerage services under this CSP	1	No.	50.0
<b>IEC Campaign</b>	Sewerage related IEC campaign for promotion of individual connections and overall sensitisation towards environmental conservation through sewerage management	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Training &amp; Capacity Building</b>	TCB programme for waste water department	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Total</b>				<b>INR 1,360 lakh</b>

Total investment requirement for sewerage sector:

Component	Block Cost (INR in lakh)
Infrastructure Works	12,516
Studies & Programmes	1,360
<b>Total</b>	<b>INR 13,876 lakh</b>

## 6.3. Sanitation

This section analyses existing sanitation services in Ahmedabad with specific issues as well as gaps projected till 2021. This is followed by proposals under this CSP to fulfil any existing gaps as well as provide basic minimum services in sanitation to the city for the future. This section is structured as below:

- i. Access of households to toilets
- ii. Coverage of Public Conveniences
- iii. Open Defecation
- iv. Existing and Projected Gaps, and Issues
- v. Ongoing Initiatives and Proposals under this CSP for improving Sanitation Services

### 6.3.1. Access of households to toilets in Ahmedabad

Overall, Ahmedabad city has a fairly good coverage by access to individual toilets of all households. Out of a total of 12.71 lakh households in the city, 96 percent of households have access to individual toilets. Out of 12.71 lakh households, around 1.73 lakh households are staying in slums. Of these 1.73 lakh households, around 56,000 households (33 percent) do not have access to individual toilets. As reported by AMC, all non slum households have individual toilets.

### 6.3.2. Coverage of Public Conveniences

#### Status of Community/Public Toilets

Ahmedabad city has 1,827 community toilet blocks with 7,160 seats out of which 84 blocks were reported to be non-functional. In addition to community toilets, there are 314 toilet blocks with 1,256 pay and use toilet seats. Many of the pay and use toilets have bathing facilities with a total of 807 bathing units in the city. While community toilets do not charge any user fee, pay and use toilets charge a nominal fee of INR 2/- per use for defecation and bathing, each for men only. There is no charge for use of toilets for women and children. Urinal provisions in pay and use toilets are free of charge. In addition to toilets, independent 1,182 urinals seats for men are installed in various parts of the city.

No survey has been conducted to assess the exact number of users of these facilities. As per AMC, 25 persons have been assumed per seat to assess the coverage. Hence, the current capacity of community and pay & use toilets is estimated to be around 2.4 lakh in Ahmedabad.

With a total of nearly 8,500 functional community and pay & use toilet seats, community toilets have the capacity to cater to around 1.8 lakh users while pay & use toilets have a capacity to cater 30,000 users as mentioned in Table 43 and Table 45. Based on this assumption the capacity of public conveniences is estimated to be 2.1 lakh in the entire city. Hence, number of regular users (households without individual toilets) per seat of public convenience is 9.5. Statistically, the number of toilet seats provided by AMC for public convenience is sufficient. However, regular maintenance and cleanliness of the public conveniences was found to be poor in many cases. The timings of public conveniences is also an issue as they remain locked between 2300 hrs and 0600 hrs in some localities. Locations of these toilets are unknown and there are no maps available with AMC which shows under or over served areas with public toilets.

Details of community as well as pay and use toilets have been provided in the tables below.

**Table 42 Number of Community Toilets in Ahmedabad**

S. No	Zone Name	No of Toilet Seats			No of Toilet Blocks	Non Functional Toilet Blocks
		Men	Women	Total		
1	North	883	840	1,723	353	NA
2	South	888	698	1,586	589	NA
3	East	986	906	1,892	421	NA
4	West	263	233	496	124	NA
5	Central	781	678	1,459	339	NA
6	New West	2	2	4	1	NA
<b>Total</b>		<b>3,803</b>	<b>3,357</b>	<b>7,160</b>	<b>1,827</b>	<b>48</b>

Source: (AMC, 2010); (AMC, 2012)

**Table 43 Operational Details of Community Toilets in Ahmedabad**

S. No.	Zone Name	Capacity (No. of Users Per day)	Whether Use and Pay (Y/N)	Price Per Use (Urinal)	Price Per Use (Defecation)	Price Per Use (Bathing)
1	North	43,075	N	NA	NA	NA
2	South	39,650	N			
3	East	47,300	N			
4	West	12,400	N			
5	Central	36,475	N			
6	New West	100	NA			
<b>Total</b>		<b>1,79,000</b>				

Source: (AMC, 2012)

**Table 44 Number of Pay & Use Toilets in Ahmedabad**

S. No.	Zone Name	No of Toilets Seats			No of Toilets Blocks
		Men	Women	Total	
1	North	100	100	200	50
2	South	56	56	112	28
3	East	118	118	236	59
4	West	128	128	256	64
5	Central	144	144	288	72
6	New West	82	82	164	41
<b>Total</b>		<b>628</b>	<b>628</b>	<b>1,256</b>	<b>314</b>

Source: (AMC, 2010); (AMC, 2012)

**Table 45 Operational Details of Pay & Use Toilets in Ahmedabad**

S. No.	Zone Name	Capacity (No. of Users Per day)	Whether Use and Pay (Y/N)	Price Per Use (Urinal)	Price Per Use (Defecation)	Price Per Use (Bathing)
1	North	5,000	Y	Free	2	2
2	South	2,800	Y	Free	2	2
3	East	5,900	Y	Free	2	2
4	West	6,400	Y	Free	2	2
5	Central	7,200	Y	Free	2	2
6	New West*	4,100	Y	Free	2	2
<b>Total</b>		<b>31,400</b>				

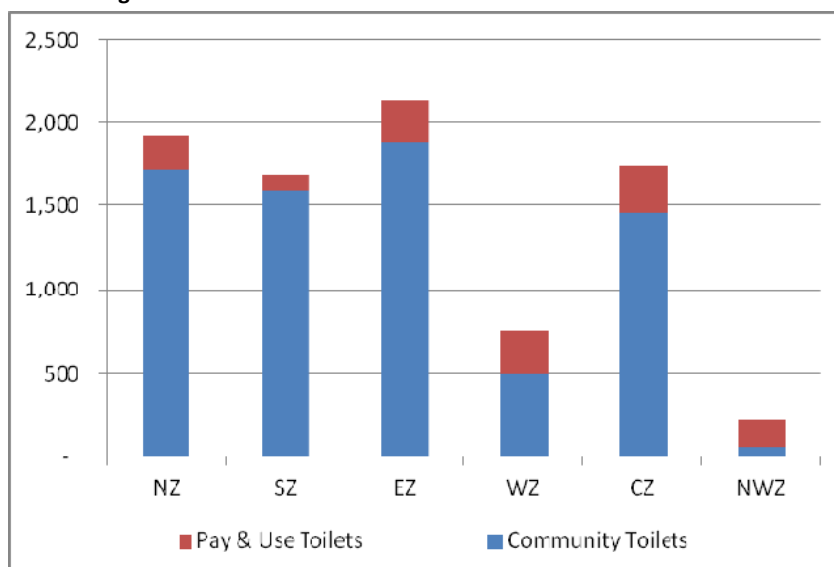
Source: (AMC, 2012)

Figure 10 Pay & Use Toilets in Ghatlodia (left & centre); Urinal without water connection (right)



Source: UMC.

Figure 11 Zone wise status of Public Conveniences in Ahmedabad



Source: (AMC, 2010); (AMC, 2012)

In addition to the toilet and urinal seats, AMC has provided bathing units for both men and women. A break-up of the same has been provided below:

Table 46 Number of Public Bathing Units and Urinals in Ahmedabad

Zone	Bathing Units			Urinals		
	Men	Women	Total	Men	Women	Total
North	101	93	<b>194</b>	211	-	<b>211</b>
South	43	34	<b>77</b>	99	-	<b>99</b>
East	130	95	<b>225</b>	196	-	<b>196</b>
West	-	-	-	-	-	-
Central	99	89	<b>188</b>	206	-	<b>206</b>
New West	59	64	<b>123</b>	167	-	<b>167</b>
<b>Total</b>	<b>432</b>	<b>375</b>	<b>807</b>	<b>1,182</b>	-	<b>1,182</b>

Source: (AMC, 2012)

As evident from the table, no separate urinals are available for women, especially at transit areas such as bus stands, interchanges, etc. Such facilities are available at these locations for men. Further, there are 685 additional public and pay & use seats for men as compared to women. An equitable distribution of such facilities based on gender is needed in the city. Also, the additional men and women seats may be converted to either toilet seats for differently-abled, bathing units, child-

friendly toilet seats or urinals. In case, even after converting the excess toilet seats to the above listed functions, the remaining may be converted to janitor rooms or storages in various blocks.

Based on the data available for various public conveniences in the city, the existing situation has been summarised for men, women and differently-abled in the table below:

**Table 47 Summary of Existing Public Conveniences in Ahmedabad**

Public Convenience	Existing Delivery	Unit
Toilet seats (Men)	4,431	No.
Toilet Seats (Women)	3,985	No.
Toilet Seats (Differently-Abled)	-	No.
Child-friendly Toilet Seats	-	No.
<b>Total Seats</b>	<b>8,416</b>	<b>No.</b>
Urinals (Men)	1,182	No.
Additional Seats for Women (substituting urinals)	-	No.
<b>Total Seats</b>	<b>1,182</b>	<b>No.</b>
Bathing Units (Men)	432	No.
Bathing Units (Women)	375	No.
Bathing Units (Differently-Abled)	-	No.
<b>Total Bathing Units</b>	<b>807</b>	<b>No.</b>

Source: (AMC, 2010); (AMC, 2012)

There are no child friendly public toilets in Ahmedabad giving very little choice to children but to defecate in the open. The construction techniques, materials and design standards are in dire need for revision as the current public toilets lack natural or artificial light and ventilation while providing very cramped space to its users. Men's urinals in many places were found to be without any water connections, further deteriorating their sanitary condition. There are no provisions of public conveniences for differently-abled and assisted users in the city.

### 6.3.3. Open Defecation (OD)

According to newspaper reports, more than 64,000 sanitation workers are still engaged in manual scavenging in Gujarat (TNN, HC directive to Gujarat Govt. on manual scavenging, 2011). The Gujarat high court had earlier issued directions for total abolition of manual scavenging in the state.

According to AMC, manual scavenging is not practised in the city anymore, though despite sufficient provision of public convenience seats, open defecation occurs at a few sites. Street sweepers cleaning the roads are subject to a form of manual scavenging while they clean the OD spots. In the absence of AMC conducted a city-wide survey in 2010 and revised it in 2012 to assess the extent of open defecation in the city. As per the survey, 157 open defecation spots were found in the city.

**Table 48 Zone wise number of open defecation spots**

Zones	Total OD Sites
Central	36
South	14
East	11
North	32
West	53
New West	11
<b>TOTAL</b>	<b>157</b>

Source: (AMC, 2012)

**Figure 12 Open Defecation at Ramapir no Tekro**

Source: UMC.

#### 6.3.4. Gaps in Sanitation Services

As directed by the Government of Gujarat, all slum households should be provided with individual toilets in congruence with the objectives of the *Nirmal Gujarat* (UD&HD, 2008). Hence, public toilets are to be provided at public places for floating population and other city users.

In order to achieve complete sanitation, some existing public conveniences need to be refurbished while some additional need to be constructed. No mapping of existing public conveniences exists. Hence, certain assumptions have been adopted as defined below:

**Table 49 Assumptions for estimating public conveniences demands**

Assumptions	Remarks
Assumption 01	Floating population of the city – 5 percent of total population
Assumption 02	Local city dwellers using public toilets – 1 percent of total population
Assumption 03	Around 25 percent of existing toilet seats, urinals, bathing units are in need of repairs and refurbishment
Assumption 04	New toilet seats needed – 1 percent of existing seats (to ensure access in public areas)
Assumption 05	Total number of toilet seats would be shared equally for men, women and differently-abled
Assumption 06	Male and female urinals to be computed @ 1 for every 200 users, no separate urinals for differently-abled. All existing men's urinals would be refurbished to ensure water connections, drainage, meeting other design standards, etc.
Assumption 07	Number of bathing units needed has been assumed to be 1/3rd of total toilet seats in the city for men and women and 1/6th of total toilet seats for differently-abled. The bathing units are to be placed at transit locations.
Assumption 08	One child friendly seat is to be provided for every 5 seats for adults (excluding differently-abled)

Based on the above assumptions, the current and projected demand till 2021 for public conveniences has been calculated below:

**Table 50 Current & Projected Demand for Total Toilet and Urinal Seats**

Description	Dec-2011	2016	2021
City Population	55,68,695	64,94,177	75,73,468
Floating population (@ 5%)	2,78,435	3,24,709	3,78,673
Local city users (@ 1%)	55,687	64,942	75,735
<b>Total Users for Public Conveniences</b>	<b>3,34,122</b>	<b>3,89,651</b>	<b>4,54,408</b>
<b>Existing and Projected Demand for Public Conveniences</b>			
No. of toilet seats needed for floating population and city users (@ 1 for 100 users) & additional 50% for differently-abled	5,013	5,847	6,819
No. of urinals needed (@ 1 for 200 users)	1,672	1,950	2,274
No. of bathing units needed (1/3 of total toilet seats for men & women, 1/6 <sup>th</sup> of total seats for differently-abled)	1,393	1,625	1,895
<i>Note: Population projections done by AMC have been adopted for projected gaps assessment. The projections for 2016 and 2021 are INR 64.94 lakh and INR 75.73 lakh respectively.</i>			

Source: UMC.

As computed in the table above, the existing supply of aggregate toilet seats is more than the demand. However, equitable distribution for men, women and differently-abled persons needs to be ensured by repairing and refurbishing the existing seats to suit the users' requirements. Also many areas are unserved or underserved by such public convenience seats (especially transit areas and high density commercial areas) and hence despite more than sufficient existing seats, 950 additional seats (10 percent of total existing seats) have been proposed.

Similarly, urinals and bathing units too need to be distributed in an equitable manner based on usage patterns for men, women and differently-abled. In order to do so, a detailed demand based on type of user (men, women and differently-abled) have been calculated below for toilet seats, urinals and bathing units.

**Table 51 Current & Projected Gaps for Public Conveniences for Men, Women & Differently-abled**

Public Convenience	Existing Delivery	2011		2016		2021		Unit
		Demand	Gap	Demand	Gap	Demand	Gap	
Toilet seats (Men)	4,431	1,671	-	1,949	-	2,273	-	No.
Toilet Seats (Women)	3,985	1,671	-	1,949	-	2,273	-	No.
Toilet Seats (Differently-Abled)	-	1,671	1,671	1,949	1,949	2,273	2,273	No.
Child-friendly Toilet Seats	-	334	334	390	390	455	455	No.
<b>Total Toilet Seats</b>	<b>8,416</b>	<b>5,013</b>	<b>1,671</b>	<b>5,847</b>	<b>1,949</b>	<b>6,819</b>	<b>2,273</b>	<b>No.</b>
Urinals (Men)	1,182	836	-	975	-	1,137	-	No.
Additional Seats for Women (substituting urinals)	-	836	836	975	975	1,137	1,137	No.
<b>Total Toilet Seats</b>	<b>1,182</b>	<b>1,672</b>	<b>836</b>	<b>1,950</b>	<b>975</b>	<b>2,274</b>	<b>1,137</b>	<b>No.</b>
Bathing Units (Men)	216	557	341	650	93	758	108	No.
Bathing Units (Women)	188	557	369	650	93	758	108	No.
Bathing Units (Differently-Abled)	-	279	279	325	47	379	54	No.
<b>Total Bathing Units</b>	<b>404</b>	<b>1,393</b>	<b>989</b>	<b>1,625</b>	<b>233</b>	<b>1,895</b>	<b>270</b>	<b>No.</b>
<b>Janitor Rooms/ Storage</b>	<b>-</b>	<b>1671</b>	<b>1671</b>	<b>1949</b>	<b>1949</b>	<b>2273</b>	<b>2273</b>	<b>No.</b>

Source: UMC.

In case of toilet seats, the existing seats (4,431 for men and 3,985 for women) exceed the total demand of seats in the year 2021. As mentioned earlier, reconfiguration of toilet seats to ensure equitable distribution for men, women and differently-abled the additional seats can be refurbished to become urinals, additional toilet seats for women (as substitute for urinals), bathing units, child-friendly toilets seats and janitor rooms/ storages.

Based on the demand, a total of 1,137 additional toilet seats (as a substitute for urinals) for women need to be provided by the year 2021 in addition to a total of 1,088 bathing units – 326, 383 and 379 units for men, women and differently-abled respectively.

Additional 10% of existing toilet seats have been proposed keeping in mind the absence of these facilities at appropriate locations in public areas. Likewise, number of urinals needed is 836 for men and women each. However, 1182 urinals for men exist and hence, in order to retain these, 25 percent of the existing men's urinals are proposed to be refurbished.

### 6.3.5. Issues in Sanitation Services

The key issues identified in service delivery of sanitation services are as follows:

- Delays in provision of sewerage network in slum areas (by AMC) leading to NGSY's disapproval of requests by slum households to obtain individual toilets.



- There are no public conveniences for either the differently-abled users or for assisted users. Toilets have been designed insensitively ignoring the need for barrier free access to all.
- Absence of community toilets in the proximity to households without access to individual toilets
- Non-functional public toilets in slum areas
- Timings of pay-&-use toilets. Not all are open 24x7
- Ill-maintained community toilets
- Uneven spread of community toilets and inadequate toilet seats for local requirements in many areas
- In some Public Toilets, there is acute shortage of water supply due to which Safai Kamdars are not able to clean the toilets regularly.
- Irregular water supply was observed in many toilets
- Many taps and other fitting are either broken or stolen
- Poor light conditions inside the toilet block also discourages its use, hence encouraging open defecation
- Design flaws in toilets lead to inadequate ventilation, odour and hence unusable conditions
- Toilets are unfriendly for use by children, old, differently-abled and assisted users. There is no provision for access for wheelchair users or person with walking sticks/ crutches.
- Insect and flies are a common feature in many toilets
- Drainage line of many public toilets was found choked with *pan masala* and *gutka* packets due to absence of civic awareness (AMC, 2010).
- In some areas it is not locals, but labourers, who defecate in open due lack of facilities for them
- Girls shy away attending schools where toilets are not available. Alternatively, they have to go home to use toilet facilities.
- Safai Karmacharis in some wards do not receive proper equipments, and in many cases where the equipments are provided, the Safai karmacharis do not use it. A weak mechanism of monitoring increases the problem.
- Lack of awareness of public health and hygiene is single most important factor of open defecation. One example is either absence of wash basins or non functional wash basins, soaps, etc.

### 6.3.6. Proposals of City Sanitation Plan for Sanitation Services

#### Ongoing Initiatives

There are various ongoing initiatives in Ahmedabad for provision of sanitation infrastructure. Some of them include provision of individual toilets to households, provision of community and pay & use toilets in the city, measures for cleaning and removal of open defecation spots and preventing their resurfacing. There are schemes such as SNP, 500 NOC Scheme, etc. which provide basic infrastructure to the slums and hence contribute directly and indirectly to improving sanitation.

As mentioned earlier, all households should be provided individual toilets, hence a total of 51,946 households need to be provided with individual toilets at the earliest. Henceforth, it has to be ensured that all new tenements are equipped with an individual toilet which is connected to the sewerage system of the city.

In order to fulfil the gaps in individual toilets and provision of public conveniences for floating population as well as city users, the investment requirements have been presented below:

**Table 52 Infrastructure Works Proposed under CSP for improving Sanitation Services until 2021**

S. No.	Description	Proposed Improvement		Unit	Block Cost (INR in lakh)
		2016	2021		
<b>Provision of Individual Toilets</b>					
1	Construction of individual toilets	50,737	-	Number	2,029 <sup>9</sup>
<b>Provision of Public Conveniences</b>					
<b>Toilet Seats</b>					
2	Refurbishment of public/ pay & use toilet seats	1,462	1,705	Number	1,979
3	Construction of new toilet seats	2,895	481	Number	3,935
4	Refurbishment of existing men's urinals	296	296	Number	185
5	New Urinals (for women)	975	162	Number	711
6	Construction of bathing units	1,221	270	Number	1,864
7	Refurbishment of bathing units	348	406	Number	943
8	Conversion of additional toilet seats to Janitor's Room/ Storage	1,224	-	Number	777
9	New Janitor's Room/ Storage	705	1029	Number	1084
<b>Total</b>					<b>INR 13,508 lakh</b>
<i>Note: * Govt. Contribution: INR 2,182 lakh;</i>					

In addition to infrastructural improvements shown above, the city needs various studies and programmes to improve sanitation services in the city as listed below:

**Table 53 Studies and Programmes Proposed under CSP for improving Sanitation Services until 2021**

Component	Description	Quantity	Unit	Block Cost
<b>DPR Preparation</b>	Preparation of DPR for undertaking sanitation works proposed under this CSP	1	No.	INR 50 lakh
<b>GIS Database preparation</b>	Preparation of GIS Database for Sanitation services under this CSP	1	No.	INR 50 lakh
<b>IEC Campaign</b>	Sanitation and eliminating OD related IEC campaign	Yearly activity for 9 years @ INR 70 lakh per year		INR 630 lakh
<b>Training &amp; Capacity Building</b>	TCB programme for Sanitation Department	Yearly activity for 9 years @ INR 70 lakh per year		INR 630 lakh
<b>Total</b>				<b>INR 1,360 lakh</b>

<sup>9</sup> As per NGSY, government subsidy for building individual toilets is INR 4,000/- only while the actual expense for construction of a toilet is INR 15,000/- (totally INR 7,611 lakh). Hence, for investment plan under this CSP, only government share has been provided.

In addition to the above physical infrastructure, open defecation needs to be addressed separately through special programmes for creating OD free city. Some of the suggestions for reducing open defecation in the city are as follows:

- Prepare **design guidelines** to be followed which could include but not be limited to
  - **design considerations to make children-friendly toilet seats** in the toilet complexes. Open defecation is majorly seen among children of slums.
  - Overall sensitively designed complexes with adequate light, ventilation
  - Follow design standards for differently-abled and assisted persons
  - Improved design and quality of sanitary and electrical fixtures
  - Facilities such as mirrors, hooks for hanging clothes, belongings, etc.
  - Small counters for keeping bags, purses, etc.
  - Fully equipped janitor's room
- **Staffing and Management:**
  - Arrange for visits of the sanitation workers to areas where the toilets are well maintained to share best practices
  - Implement MIS based staffing
- **Maintenance Schedule:**
  - Ensure regular cleaning of the community toilets as well as the drainage lines
  - Inventory of consumables including cleaners, soaps, etc. to ensure adequate stocks
  - Implement MIS based reporting and inspection mechanism
  - Monitor regular water supply

Total investment requirement for sanitation sector:

Component	Block Cost (INR in lakh)
Infrastructure Works	13,508
Studies & Programmes	1,360
<b>Total</b>	<b>INR 14,868 lakh</b>

## 6.4. Storm Water Drainage

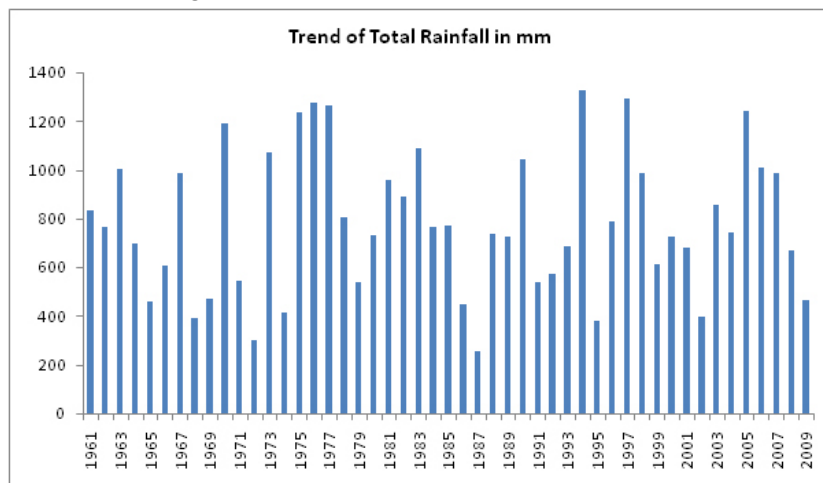
Ahmedabad has a separate system for sanitary sewers as well as storm water drains in AMC Area. Ahmedabad had built a total of 113 km of storm water drains by 1961 compared to a road length of 803 km which was later augmented at various stages. AMC added a mere 45 km of drains during 1961-71 which was further augmented by 71 km length of drains by 1981 amounting to a total of 229. At the turn of the century, AMC had a total of 290 km of drain length while the road length was 1,272 km. As of December 2011, the total length of storm water drains is reported by AMC as 731 km against road length of nearly 3000 kms.

### Rainfall Pattern in Ahmedabad

The average annual rainfall is of the order of 740 mm. Most of the rain is in the months of June, July, August and September. The graph below shows the trend of rainfall in Ahmedabad since 1961.

With changes in climatic conditions, the number of days of rainfall has reduced, thereby increasing the load on existing storm water drainage system. Owing to this changing attribute, AMC's approach towards management of storm water is not based on coverage in proportion to road length. Instead, due to the topography of the city, it is based on number of flooding incidents and locations of frequent flooding spots. Based on the analysis of 25 years of flooding data, storm water drainage has been designed in accordance to handle local flooding.

Figure 13 Rainfall trend in Ahmedabad since 1961



Source: (CEPT\_University, 2006)

This remainder of this section analyses existing storm water drainage (SWD) services in Ahmedabad with specific issues as well gaps projected till 2021. This is followed by proposals under this CSP to fulfil any existing gaps as well as provide basic minimum services in SWD to the city for the future.

This section is structure as below:

- i. Existing SWD Network
- ii. SWD Service in Slum Areas
- iii. Water Logging
- iv. Ongoing Initiatives and Past Initiatives taken by AMC
- v. Existing and Projected Gaps, and Issues
- vi. Proposals under this CSP for improving SWD Services

### 6.4.1. Existing Storm Water Drainage Network

The AMC has planned and implemented storm water collection and disposal system dividing into 6 zones. Total length of roads in AMC is 2976 km with 1484 km classified as major roads (30 feet and wider), while the length of storm water drains is 731.71 km. According to the SLB standards, storm water drains cover only 25 percent of the roads in the city. The deficiency in drain lengths increases the volume of storm water flow on roads surfaces. This eventually affects roads surfaces leading to increased maintenance. The storm water drains discharge the collected rain water into Sabarmati River at different locations. The details of storm water drains in AMC are as below:

Figure 14 Lakes - Crucial for Storm Water Drainage



Source: UMC

Table 54 Details of Drainage Network in Ahmedabad

Zone Name	Drain Length in Km
North	132.6
South	151.2
East	132.0
West	148.9
Central	48.8
New west	118.2
<b>Total</b>	<b>731.7</b>

Source: (AMC, 2012)

### 6.4.2. Storm Water Drainage Service in Slum Areas

The slums do not have dedicated storm water drains. However, the run-off (over roads) drains itself in the storm water drains on nearby municipal roads. In many cases, it has been reported that storm water run-off during monsoons is disposed in sewerage network by manual opening of manholes. No statistics are available for coverage of storm water drains in slum areas.

Most of the settlements that have been merged within the AMC limits had a natural lake. This was maintained by the village and which was fed by natural drains in the catchment areas. However, with rapid pace of urbanization and land development, this natural system has been disturbed leading to inundation of many areas during rainy season, while the lakes were deprived of their share of runoff water. AMC has undertaken lakes interlinking project in order to revive the lakes and integrated them in rain water management system.

### 6.4.3. Water Logging Problems

During last 2 decades, AMC is experiencing flooding during heavy rains, causing disturbance in normal civic life activities. With increased hard surfaces in the city, storm water percolation in the ground has reduced and has resulted in higher runoff putting additional strain on the storm water drainage system and causing localised water logging in various parts of the city. AMC has taken up provision of comprehensive network of SWD to prevent flooding. The incidents of water logging have been recorded and are presented in the table below:

**Table 55 Incidence of water logging in Ahmedabad, 2010-11**

Zone Name	Unit	Incidents of flooding/ water logging
North	Number	9
South	Number	5
East	Number	4
West	Number	3
Central	Number	-
New west	Number	15
<b>Total</b>	<b>Number</b>	<b>36</b>

Source: (AMC, 2012)

### 6.4.4. Ongoing Initiatives and Works undertaken by AMC in the past

Storm water network has been provided along all the major roads as well as areas prone to water logging. As mentioned earlier, the approach of AMC is to eliminate flooding and hence, AMC manages storm water through effective management of water logging spots.

The network design of storm water drains in Ahmedabad has been carried out using automated softwares as the per the norms and standards for Storm Water Networks proposed by the CPHEEO, Ministry of Urban Development, Govt of India.

RCC Pipelines from 300 mm to 2000 mm diameter have been proposed as per detailed design requirements. For larger size above 2000 mm, RCC slab drains of different size were proposed.

Appurtenances such as, catch pits, curb inlet with catch basin, manholes are being implemented to effectively channelize the runoff into the storm network. Disposal of storm water is in River Sabarmati and in Kharicut Canal through gravity. The table below shows the lengths and cost of SWD under implementation (approved under JnNURM):

**Table 56 SWD Projects Implemented in Various Zones under JnNURM**

Name of Zone	Cost (INR in crores)	Length (in km)
North Zone	77.77	110.6
East Zone	45.06	76.5
Central Zone	3.51	2.0
South Zone	117.37	139.0
West Zone	59.14	79.3
<b>Grand Total</b>	<b>302.85</b>	<b>407.4</b>

Source: (AMC, 2012)

Figure 15 New Pipelines Laying



Source: (AMC, 2011)

For the newly added New West Zone, 102 km of SWD work is under progress at a cost of INR 72 crore. As per AMC, the entire urbanised area of AMC has been covered by storm water drains effectively.

Figure 16 Canal in New West Zone, Ahmedabad



Source: UMC.

AMC has used the existing lakes in the city as intermediate storages which result in recharge of the ground aquifers and prevent further depletion of water table. A separate project for development of the lakes for beautification including increasing the capacity of the lakes for better Watershed Management is also under preparation by AMC.

#### 6.4.5. Service Level Benchmarking and Gaps in Storm Water Drainage Services

Based on the infrastructural provisions and service delivery records maintained by AMC, the gaps in the same for storm water drainage services has been summarised below:

**Table 57 Service Level Benchmarking in Sewerage and Gaps in Service Delivery**

Performance Indicator	Benchmark	2011-12 (till Dec)
Road Length Covered by Drains	100%	24%
Incidents of water logging/ flooding	0	36

Source: UMC.

Based on the SLB benchmark, Ahmedabad city needs to augment its storm water drainage network by 2,244 km. However, as AMC's approach is towards management of water logging spots, AMC needs to manage water logging at 36 locations in the city. Hence, as claimed by AMC, 100 percent of areas are covered by storm water drains, no augmentation of drain length is required.

#### Projected Gaps

In the coming years, as the city grows and new areas develop, AMC would need to provide storm water drains to these areas. AMC is observing incidents of water logging in the newly developed areas and would plan storm water drainage network in these areas to eliminate these spots. Hence, for the purpose of this CSP, projected gaps in of SWM in length cannot be quantified. Therefore, Based on the above methodology, quantitative gaps have not been computed in the table below:

**Table 58 Existing and Projected Incremental Gaps in Sewerage Services**

Storm Water Drainage	2011		2016	2021	Unit
	Existing Demand	Existing Delivery	Gap	Gap	
SWD Network Length	2,976	731	-*	Projected gap for SWD can be quantified in the future based on water logging spots in areas as they develop	Km

*Note: \* As per AMC, despite shortfalls in SWD network in comparison to road length, 100 percentage coverage has been provided in urbanised areas of AMC. Hence, the existing system is sufficient.  
Population projections done by AMC (at 2016 and 2021 are 64.94 lakh and 75.73 lakh) have been adopted for projected gaps assessment.*

Source: UMC.

#### 6.4.6. Issues in Storm Water Drainage Services

As storm water drainage is crucial in mitigating health hazards related to stagnation of water and other associated risks such as malaria, gastroenteritis, cholera, etc., AMC has been working towards improving the drainage system in Ahmedabad. AMC has collated data of the last 25 years data of water logging spots and accordingly the SWD improvements have been designed. Based on the analysis of the SWD system, the key issues identified in service delivery of storm water drainage are as follows:

- With climate change, the number of days of rainfall in Ahmedabad has reduced, thereby increasing the pressure on existing storm water drainage. Based on CPHEEO norms, the existing system is designed for rains upto 1 inch per hour.
- Slums coverage of storm water drainage services is only 58 percent.
- In some cases, water collection along the roads and railway tracks has been observed



- AMC claims, DPR has been prepared with the objective of managing local water logging and is sufficient for the city. However, drain lengths as per SLB and other benchmarks is highly inadequate.
- Although mandatory, enforcement of rain water harvesting is weak and building owners construct it for permission purposes only.
- It is reported that in many cases, due to unofficial linkages between sewerage and SWD, sewage is discharged through SWD in River Sabarmati (Tam, 2011).

Figure 17 Water logged road in Ahmedabad, 2011



Source: Left: (TNN, When it rains, it floods, 2011); Centre & Right: UMC

Figure 18 Khari Cut Canal - facing the brunt of solid waste, sewage and industrial effluent disposal



Source: UMC

#### 6.4.7. Proposals of City Sanitation Plan for Storm Water Drainage Services

AMC claims 100 percent city would be covered by SWD service in existing urbanised area upon completion of ongoing works. AMC's approach to SWD service for existing urbanised area is to eliminate local flooding and as per AMC, SLB benchmarks (and other benchmarks such as CPHEEO) do not apply for Ahmedabad owing to its unique system.

However, for new developments in the future, additional 1,071 km of road length would be required by the year 2021. As per CPHEEO guidelines, SWD drain length should be 130 percent of road length. Based on these norms, gaps in SWD network for 2021 have been computed in the table below:

**Table 59 Infrastructure Works Proposed under CSP for Improving Storm Water Drainage Services until 2021**

S. No.	Description	Proposed Improvement		Unit	Block Cost (INR in lakh)
		2016	2021		
1	Construction of new SWD in future developments	Projected gap for SWD can be quantified in the future based on water logging spots in areas as they develop. Hence, future investment cannot be estimated as of today.			
<b>Total</b>					-

In addition to infrastructural improvements shown above, the city needs other initiatives to improve SWD services in the city as listed below:

**Table 60 Studies and Programmes Proposed under CSP for Improving Storm Water Drainage Services until 2021**

Component	Description	Quantity	Unit	Block Cost (INR in lakh)
<b>DPR Preparation</b>	Preparation of DPR for implementation of SWD works proposed under this CSP	1	No.	50.0
<b>GIS Database preparation</b>	Preparation of GIS Database for SWD services under this CSP	1	No.	50.0
<b>IEC Campaign</b>	Storm Water Drainage and rain water harvesting related IEC campaign	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Training &amp; Capacity Building</b>	TCB programme for Sanitation Department	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Total</b>				<b>INR 1,360 lakh</b>

Total investment requirement for storm water drainage sector:

Component	Block Cost (INR in lakh)
Infrastructure Works	-
Studies & Programmes	1,360
<b>Total</b>	<b>INR 1,360 lakh</b>

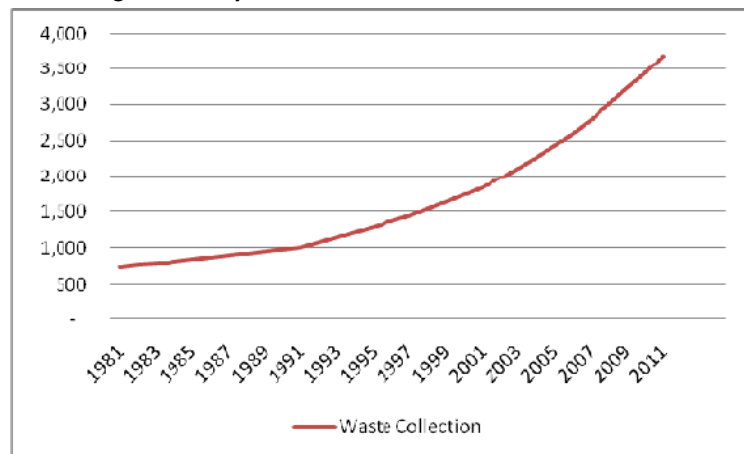
## 6.5. Solid Waste Management

This section conducts analysis of existing SWM services in Ahmedabad with specific issues as well as gaps projected till 2021. This is followed by proposals under this CSP to fulfil any existing gaps as well as provide basic minimum services in sanitation to the city for the future. This section is structured as below:

- i. MSW Generation
- ii. MSW Collection & Segregation in the city
- iii. MSW Transportation
- iv. MSW Processing
- v. MSW Disposal
- vi. Staffing and Management
- vii. New Initiatives of AMC in SWM Services
- viii. Existing and Projected Gaps, and Issues
- ix. Ongoing Initiatives and Proposals under this CSP for improving Sanitation Services

Over the years, municipal solid waste (MSW) has been increasing exponentially. AMC has been providing services to collect, transport, treat and dispose the same. Daily MSW collection in AMC has increased from a 750 MT to nearly 4000 MT in 2011. The graph below shows this growth:

**Figure 19 Daily MSW Collection in Ahmedabad since 1981**



Source: (AMC, 2012)

### 6.5.1. MSW Generation

A detailed break up of MSW generated by various categories of use is as follows:

**Table 61 Estimated Waste Generation in Ahmedabad**

Category	Unit	Waste Generated	Percentage*
Residential	Tons/ Month	63,080	57 %
Street Sweeping	Tons/ Month	26,561	24 %
Hotels' and restaurants' kitchen	Tons/ Month	2,213	2 %
Special markets (e.g. veg. & non veg. markets, mandis)	Tons/ Month	NA	NA
Commercial establishments (incl. offices, institutions)	Tons/ Month	NA	NA
Other (C&D waste, etc.)	Tons/ Month	18,814	17 %
<b>Total</b>	<b>Tons/ Month</b>	<b>110,667</b>	

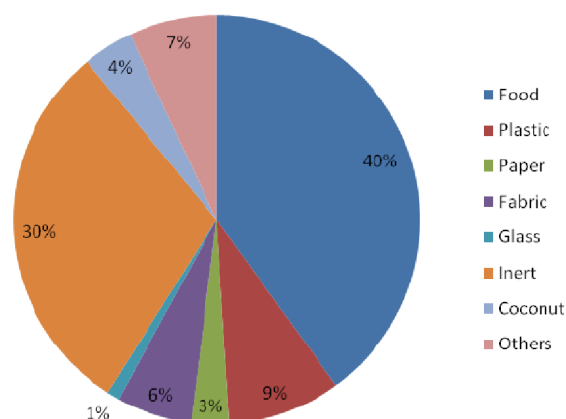
Note: \* This percentage is based on percentage allocation to categories of waste prepared by AMC in 2009 for SLB data.

Source: (AMC, 2012)

Majority of waste is generated from households (57%), followed by 24% from street sweeping, while only 2 percent waste is generated by kitchens of hotels and restaurants. Details of waste generated by commercial establishments and special markets are not available. However, since household collection covers commercial establishments as well, it is assumed that the two categories are included in residential.

Samples tested at Pirana dumping site revealed high content of food waste – around 40 percent. As seen from domestic waste characterisation and samples from Pirana dump site, it presents a strong case for promoting segregation of wet waste at source and hence designing MSWM system for Ahmedabad to cater to segregated waste.

**Figure 20 Composition of Waste Reaching Pirana Dump Site (Feb 2010)**



Source: (Abellon, 2012)

## 6.5.2. Segregation of Waste

### Current Situation of MSW Segregation in Ahmedabad

Two bins system has not been adopted by AMC and hence there is no segregation at source. AMC estimates that daily around 100 metric tons (MT) of dry recyclable valuable MSW is picked up by rag pickers in the city. MSW processing facilities have automated mechanical waste segregation process. In addition to this, AMC collects and transports waste from hotels' and restaurants' kitchens (1,495 MT), C&D waste (12,694 MT), dead animals & waste from slaughter house (216 MT) separately. Hence, considering the above wastes, around 13.4 percent of waste is collected and transported in segregated manner.

Once collected through Door/Gate to Dump system, MSW is transported to treatment plants or disposal sites directly without any manual handling and mixing of any other MSW.

**Table 62 Segregation of MSW**

		2011
Are two bins provided for MSW segregation (Yes/No)		<b>No</b>
If Yes, Households provided two bins	Numbers	
Commercial establishment provided with two bins	Numbers	None
Is MSW collected in segregated form through D-T-D service (Yes/No)		No
If yes, Quantity of segregated biodegradable waste collected from D-T-D service	Tons/ Month	
Is MSW transported in segregated form to Processing/Disposal facility (Yes/ No)		No
If yes, Quantity of segregated MSW arriving at Processing/ Disposal facility	Tons/ Month	-
Quantity of MSW taken away by recyclers from intermediate points *	Tons/ Month	100
Is bulk MSW generated in the ULB is collected separately (Yes/ No)		Yes
If yes, Quantity of bulk MSW collected separately	Tons/ Month	14,405
If data from above are not available, then		
Quantity of MSW segregated as estimated by ULB	Tons/ Month	13%
<b>Total MSW segregated in the ULB</b>	<b>Tons/ Month</b>	<b>14,505</b>
Note: * Estimated by SWM Department, AMC. MSW picked up waste pickers is usually for valuable dry recyclable.		

Source: (AMC, 2012)

**Figure 21 Mixed H&K Waste Collection & Disposal is Open Dump**



Note: (Left) Mixed MSW being dumped H&K waste; (Centre) Mixed waste being collected by H&K Van; (Right) H&K Waste being dumped in open and garbage (plastic) bags being manually scavenged by waste pickers.

Source: UMC

### Informal & Unauthorised MSW Segregation

It has been observed on numerous instances where municipal/ contracted staff resorts to manual segregation of waste from container bins as well as municipal vehicles as illustrated in Figure 22:

**Figure 22 Manual segregation from AMC vehicle and improvised storage for segregated waste**



Source: UMC

In addition to municipal/ contracted workers, waste pickers also manually segregate waste at various stages of transportation and processing in the municipal stream. Manual segregation in apartments and societies has been observed by societies' own staff to extract dry recyclable for selling to recyclers.

**Table 63 Stages of MSWM at which manual segregation takes place**

Stage of MSWM	Segregation done by
Door step collection	Societies' own staff
Handing over to municipal van	Door/Gate to Dump collection staff
Transportation from Gate to Compactor (refer Figure 22)	Door/Gate to Dump collection staff
Secondary collection bins	Independent waste pickers
Open dumping site at Pirana	Independent waste pickers

Source: UMC

As evident, manual segregation is prevalent at all stages of MSW management by societies' staff, municipal workers as well as independent waste pickers. The CPHEEO manual on municipal solid waste management recognises importance of segregation and hazardous nature of this practice. It further recommends formalising waste pickers into municipal stream with appropriate technology to incorporate them at any mechanised sorting facility being setup by the ULB or its contracted out agency.

"In India, centralised sorting is not adopted. However, some intermediate sorting does occur after household wastes reach kerbside collection bins (*dhalao*s) through rag pickers. There is a need to formalise this intermediate sorting system or develop a centralised sorting facility to minimise recyclable materials reaching a waste processing facility or a landfill."

(CPHEEO, 2000), p 20

### 6.5.3. Collection of Waste

Entire MSW generated in Ahmedabad is collected using various means including Door/Gate to Dump, street sweeping, direct collection of MSW from slaughter house, fish and meat markets, lifting of dead animals, hotels' and restaurants' kitchen MSW, construction waste and debris, etc.

**Figure 23 Various streams of collection of MSW in Ahmedabad**



Source: UMC

A breakup of MSW collected monthly from various zones under these categories has been provided below. As per the records maintained by AMC, total MSW collection peaks during December and hence December 2011 has been considered as the peak value for all related calculations.

**Table 64 Actual Waste Collected in Ahmedabad, December 2011**

Category	Unit	Waste Collected	Percentage
Residential/D to D*	Tons/ Month	26,622	24.5%
From Municipal Bins (incl. Street Sweeping)	Tons/ Month	56,018	51.7%
Hotels' and restaurants' kitchen	Tons/ Month	1,495	1.4%
Dead Animals & Special markets (meat & fish markets)	Tons/ Month	216	0.2%
Commercial establishments* (incl. offices, institutions)	Tons/ Month	11,409	10.5%
Other (C&D, etc.)	Tons/ Month	12,694	11.7%
<b>Total</b>	<b>Tons/ Month</b>	<b>1,08,454</b>	

*Note: \* Door to Door and Gate to Gate collection includes both residential as well as commercial establishments, it is assumed based on inputs from SWM department of AMC that 70 percent of this waste is residential while remaining is commercial.*

Source: (AMC, 2012)

From the above table, it can be seen that nearly 52 percent of waste is being collected from municipal bins, which include street sweeping. Although, 100 percent of the city is covered by Door to Door or Gate to Gate collection, many households/ apartments/ associations/ commercial units are dumping waste in the municipal bins and not handing it over to the Door to Door/Gate to Gate collection vehicles. It has been observed that as the Door/Gate to Dump collection system is strengthening, the percentage of waste collected through street sweeping and municipal bins has been gradually reducing. The collection of MSW collected from municipal bins has reduced from 61 percent in March 2011 to 52 percent in December 2011.

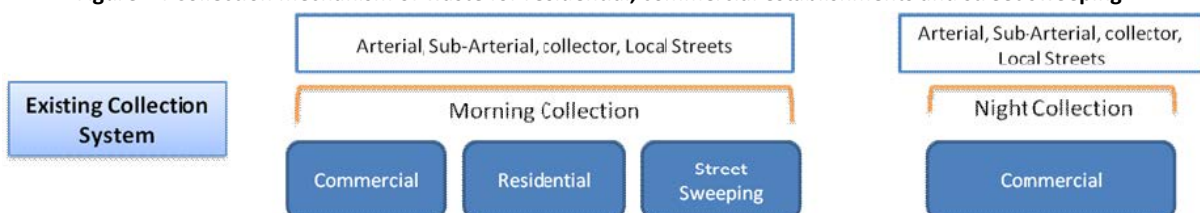
**Table 65 Zone wise Type of MSW collected during December 2011**

	CZ	WZ	NZ	EZ	SZ	NWZ	Total
Door/Gate to Dump	7,458	5,480	7,370	5,591	5,632	6,469	<b>37,999</b>
H&K MSW	126	744	171	375	80	0	<b>1,495</b>
C&D	3,789	1,066	1,883	1,790	897	3,268	<b>12,694</b>
MSW from Sec. Bins	13,473	10,569	6,868	6,557	9,322	9,477	<b>56,266</b>
<b>Total MSW Collected</b>	<b>24,846</b>	<b>17,859</b>	<b>16,293</b>	<b>14,313</b>	<b>15,931</b>	<b>19,213</b>	<b>108,454</b>

Source: (AMC, 2012)

The central and new west zones produce maximum MSW with a notably high construction and debris MSW collection. The reason for such high volume could be the minimal localised reuse of C&D waste in Central Zone and extensive construction activity in New West Zone resulting in increased collected by AMC as compared to other zones. During reconnaissance visits made by the team construction debris was found lying along roads or on vacant plots.

Under the present system of MSW collection from various streams, Door/Gate to Dump collection from residential areas is conducted during morning hours while collection from commercial establishments is done during morning and evening hours. The figure below shows the collection mechanism of residential, commercial and street sweeping streams.

**Figure 24 Collection mechanism of waste for residential, commercial establishments and street sweeping**

Source: UMC

Collection of H&K waste is conducted throughout the day with nearly 70 percent of such waste collected during the late night trip. Collection of C&D waste is based on calls by waste generators or as reported by field municipal staff.

### Door/Gate to Dump Collection in Residential Areas

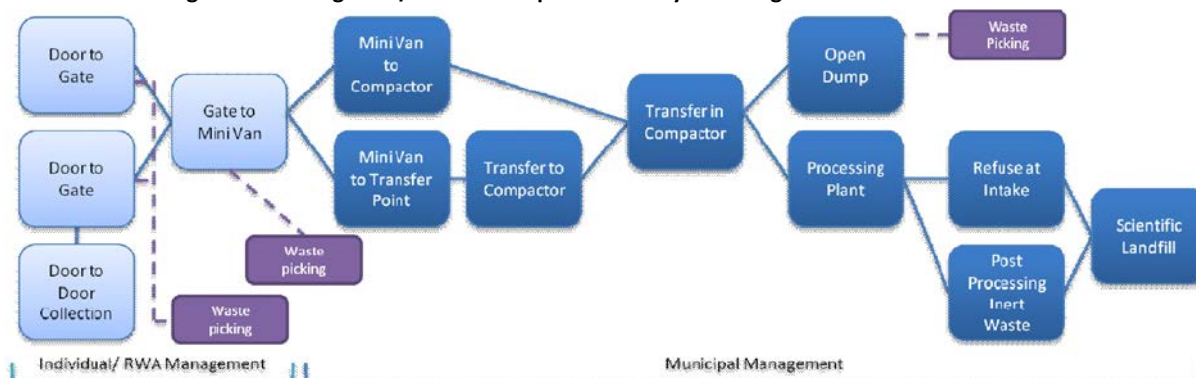
#### Previous System

Until July 2010, AMC provided daily **Door to Door** collection of MSW on Public Private Partnership (PPP) through 1075 resident's welfare associations. Under this scheme, one part-time sweeper with a tricycle was employed by RWAs and AMC would pay INR 10 per household per month from where MSW was collected. The waste collected was then transported and deposited at the nearest secondary collection bins placed across the city.

#### Current System

Since July 2010, **Door/Gate to Dump** system was initiated by AMC whereby a private contractor appointed by AMC would collect waste from gates/ main entry point of societies using a closed body container mounted Euro III vehicles. During morning hours, waste from households (largely bio-degradable in nature) is used for composting. During evening hours, waste from commercial establishments (largely dry waste) is used for producing eco-fuel. GPS enabled fleet was initially planned however, use of GPS has not been implemented.

Figure 25 Existing Door/Gate to Dump Collection System Diagram for Residential Areas



Source: UMC

In this new Door/Gate to Dump system, AMC vehicles collect MSW only from gates of societies and/or apartments, or at entry points (or last point accessible by mini-van) in case of slums and chawls. Therefore, in case of societies and apartments, it becomes the responsibility of the owners/ societies to collect waste from individual households and bring it to the society gate for collection by AMC vehicles. In case of slums, areas without residential societies/ associations or with defunct residential societies/ associations, it becomes the responsibility of individual households to carry the waste to the pre-defined collection point daily.

With these limitations, effectiveness of Door/Gate to Dump system has been in question and in many areas citizens are devoid of regular and timely collection of MSW. Residential areas where societies have employed workers for door to door collection, they have done so at their own expense which was earlier borne by AMC prior to this transfer of household level collection.



Since implementation of Door/Gate to Dump collection system, many residential societies and apartments have encroached over footpaths and road space outside their properties for storing garbage bins for collection. The same has been illustrated in the figure below.

**Figure 26 Storage of MSW on public footpaths and roads by residential societies and apartments**



Source: UMC

**Figure 27 Poorly designed bins and primary collection fleet creating operational difficulties for workers**



Source: UMC

### Door/Gate to Dump Collection in Slums

AMC provides solid waste management services in all slum areas of Ahmedabad as well. Most of the MSW generated in slums which is not collected through door/gate to dump system ends up on roads or at secondary collection points. As per AMC's Door/Gate to Dump collection system, AMC's vehicle collects waste from pre-defined location on the periphery or an easily accessible location within the slum at a fixed time. Households are expected to carry their MSW to the vehicle upon its arrival.

During field visits, it has been reported in many slums that collection vehicles skip visiting slums often. As many slums are spread over a large area, many slum dwellers do not come to know of the vehicle's arrival. Moreover, the timing of vehicle's arrival also varies significantly making it further difficult for slum households forcing them to deposit waste at secondary bins.

As per the records maintained by SWM department, all slum households are covered through the Door/Gate to Dump service. The table below shows a break up of zone-wise slum households served by AMC for MSW collection:

**Table 66 Coverage of SWM services in Slum areas of Ahmedabad (As per SWM Dept.)**

Zone	Number of HHs	Total Slum HHs	Slum HHs Covered	% of Slum HHs Covered
North	Number	17,496	16,796	96%
South	Number	45,341	41,714	92%
East	Number	10,943	10,396	95%
West	Number	45,554	44,187	97%
Central	Number	18,817	18,629	99%
New west	Number	44,088	31,500	90%
<b>Total</b>		<b>1,73,151</b>	<b>1,63,222</b>	

Source: (AMC, 2012)

The effectiveness of Door/Gate to Dump collection system in slums of Ahmedabad is not as efficient as in the rest of the city due to narrow road widths inaccessible by SWM collection vehicles. During field visits to slums in various parts of the city, secondary collection points were found to be overflowing with garbage strewn around the bins attracting stray animals. Moreover, areas around public toilets were also found to be informal MSW collection points. The figure below shows the some such examples.

**Figure 28 MSW Collection Service in Slums - Secondary Bins & Public Toilets Strewn with Garbage**

Source: UMC

### Door/Gate to Dump Collection – Commercial Establishments

With introduction of Door/Gate to Dump system in 2010, AMC claims to cover 3,37,000 commercial establishments for collecting MSW. However, on ground many shop owners have complained of irregular collection of MSW. Many commercial areas are covered during morning hours prior to opening of shops. This forces the shop owners to deposit waste along the street and footpaths to be collected later. During a field visit to Relief Road, it was observed that many shops and complexes dumped waste on footpaths and roads as Door/Gate to Dump collection vans cover that particular stretch of road prior to opening of shops. In some cases, waste from shops is stored overnight outside the shops attracting stray animals.

As of December 2011, AMC manages waste collection from residential and commercial establishments in Ahmedabad using the Door/Gate to Dump process. A detailed breakup of waste collection in Ahmedabad by categories has been provided in the table below:

**Table 67 MSW Collection from Residential & Commercial Establishments through Door/Gate to Dump Collection System in December 2011**

Category	No. of Units Covered	Waste Collected (Tons/ Month)	Percentage of Total
Residential Establishments	12,50,000	26,622	24.5%
Commercial Establishments (incl. offices, institutions)	3,37,000	11,409	10.5%
<b>Total MSW Collected by Door/Gate to Dump System</b>	<b>15,87,000</b>	<b>38,031</b>	<b>35.1%</b>
<b>Total Waste Collected by AMC</b>		<b>1,08,454</b>	

*Note: Based on records maintained by AMC, total waste collection peaks in December; hence December has been used to compare generation vs. collection.*

Source: (AMC, 2012)

Against a total generation of around 63,000 MT/month of MSW by residential and commercial establishments, only 38,031 MT/month (around 60 percent) is being collected through Door/Gate to Dump system. The remaining is either dumped at secondary collection bins or is deposited on street and footpaths and hence is picked up through street sweeping.

**Figure 29 Deposition of Waste by Commercial Establishments on footpaths and roads**

Source: UMC

### MSW Collection by Street Sweeping

Ahmedabad city has a total road length of around 3000 km as of 2011 and as the city grows, it is expected to increase to 5,500 km. Presently, there are 10,400 beats<sup>10</sup> for street sweeping and would grow rapidly with increase in the road length. AMC undertakes sweeping of all roads daily using a combination of road vacuum sweeping machines and more than 12,000 manual sweepers. The number of sweepers working with respect to the road length being swept is sufficient. Presently, road sweeping is undertaken in two time slots of 0630 hrs to 1130 hrs, and 1500 hrs to 1800 hrs.

**Table 68 Street Sweeping, 2011**

Item	Unit	
Total road length covered by street sweeping	Kilometres	2,976
Number of street sweeping beats	Number	10,395
Number of sweepers' working shifts (Dec 2011)	Number	9,672 <sup>11</sup>
Frequency of street sweeping	No. times/day	1

Source: (AMC, 2012)

<sup>10</sup> A 'beat' is a unit for street length allotted to each street sweeper to be swept every day. The length of a beat maybe dependent on the width of the street, average waste generated by that street, nature of activities on the street, traffic volume, etc.

<sup>11</sup> A total of 7,751 permanent and 3841 part time sweepers work for street sweeping amounting to a total of 9,672 person days of work being undertaken.

**Figure 30 MSW Collection by Street Sweeping**

Source: *Left* – (AMC SWM Department, 2011); *Centre & Right* – UMC.

In addition to road vacuum sweeping machines, AMC has M. S. Handcarts with provision to store 6 bins for manually collecting waste swept from the streets and public areas. The manual street sweeping staff is given the handcarts, brooms, uniform and other protective gear. However, during field visits it was observed that most of the sweepers do not use the protective gear provided to them complaining due to various reasons including poor design and quality of the gear, hindrance in performing their duties efficiently, unsuitable for a hot climate like Ahmedabad, etc.

In addition to sweeping roads and public areas, AMC also cleans around 1000 litter bins provided at various locations in the city (AMC, Door to Door Waste Collection System, 2011). However, many litter bins were found to be missing, broken or overfilled with litter. Moreover, due to absence of practice to putting garbage bags in litter bins, nearly all the litter bins were found to be extremely dirty as no regular cleaning or washing of these bins takes place.

**Table 69 Details of Litter Bins in Ahmedabad**

Litter Bin related details	
Number of street bins installed	1,000
Areas served with street bins	Not available
Garbage bags placed inside street bins	No
Repair, maintenance cleaning/ washing schedule of bins	Not available
Adequacy of capacities of street bins at respective locations	Not Assessed
System of reporting of vandalised/ missing bins for replacement	Not available
Fine/Penalty for littering on streets/ public places	Yes

**Figure 31 Litter bins placed at Kankaria (left); Broken litter bin at Ashram Road (right)**

Source: UMC

MSW collected by street sweeping and from litter bins is deposited at secondary collection bins. The secondary collection bins are then transported using dumper placers to open dumping site at Pirana. During field visits, it was observed that the design of secondary collection bins makes it inconvenient for the sweepers to empty the small bins from the handcarts. Usually, the waste gets spilled over the workers.

The secondary collection sites usually become nuisance spots with garbage strewn around the bins attracting stray animals. The situation is worsened during monsoons as many secondary collection sites do not have hard paving or proper drainage outlet for rain water, or both. To counter hygiene issues, many cities usually disperse a mixture of lime and gammexane powder as a disinfectant without recognising the toxic effects of the same. Ms. Almitra Patel, Supreme Court Committee for Solid Waste Management has criticised this practice in an article, excerpt of which has been referred below:

“There is now a Supreme Court order (in 1997 in WP 888/96) banning the use of all pesticides on urban garbage, either within the city or at the dumping-grounds. The material currently supplied as “lime” to cities, under the quality-suppressing pressures of the tender-system, is actually gypsum produced in factory effluent treatment plants while neutralizing their acid or alkaline wastes, and thus can contain traces of toxic chemicals or heavy metals, depending on the source.”

(Patel, 2003)

This practice has been stopped in Ahmedabad by AMC. Instead ‘maltheon’ which can be used without posing unreasonable risks to human health or the environment (EPA, 2008) is being used in Ahmedabad.

**Figure 32 Transfer of MSW from Street Sweeping into Compactor & Secondary Collection Bin**



Source: (AMC, Door to Door Waste Collection System, 2011)

AMC has a total of over 1,100 nuisance spots (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011) while another document listing the secondary collection sites states a total of 900 spots. As per the higher estimate, out of 1,103 spots, only 866 sites have a secondary collection bins placed while the remaining 237 spots are open dumping nuisance spots. AMC has placed order to procure more bins in order to remove this deficiency.

**Table 70 Statement of Containers and Collection Sites**

Total MSW Collection Sites	Existing No. of Containers	No. of Containers (Procurement order placed)		Existing Container Collection Sites
		5 cu.m.	7 cu.m.	
1103	866	50	1716	661

Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)

As per detailed zone wise records, there are 900 nuisance spots with the newly merged New West Zone have more than half of such spots. The service provision in SWM was highly deficient in the erstwhile Nagar Palikas and Gram Panchayats of this zone and hence the high number of such spots.

**Table 71 Zone wise number of Nuisance Spots in Ahmedabad**

Zone Name	Number of Nuisance Spots	% of total
Central	46	10%
East	79	18%
West	57	13%
South	88	20%
North	40	9%
New West	132	30%
<b>Total</b>	<b>442</b>	

Source: (AMC, 2012)

**Hotels' and Restaurants' Kitchen MSW Collection**

Since 2007-08, AMC engaged private agencies for collection of hotels' and restaurants' kitchen MSW in Ahmedabad. A 5 year contract was finalised by AMC for 2 agencies to collect waste from 6 zones. As of December 2011, this system covered around 1,017 units out of a total of 2,300 units. The table below shows zone wise number of units present and covered under this system.

**Table 72 Zone wise number of Hotels & Restaurants covered by H&K Collection**

	Central	East	North	South	West	New West	Total
Units Covered	57	75	79	159	279	368	1017
<b>Total Units</b>	<b>462</b>	<b>247</b>	<b>258</b>	<b>349</b>	<b>517</b>	<b>468</b>	<b>2301</b>
Coverage (%)	12%	30%	31%	46%	54%	79%	44%
<b>Units Uncovered</b>	<b>405</b>	<b>172</b>	<b>179</b>	<b>190</b>	<b>238</b>	<b>100</b>	<b>1284</b>

Source: (AMC, 2012)

Central zone has minimum coverage of only 11 percent while having one of the highest numbers of hotels and restaurants. Coverage in New West Zones is highest as compared to the rest at near 80 percent. Apart from formal hotels and restaurants, there are numerous informal food stalls and hawkers which are not covered under this system.

In addition to the food stalls and hawkers, a lot of food waste is being generated at retail fruits and vegetables stores – both formal and informal. Such fruits and vegetable vendors are not covered under this system of collection.

**Figure 33 Collection by H&K Vans from Hotels & Restaurants**

Source: UMC

As per the contract, the agency responsible for collection approaches the hotels and restaurants and offers collection service based on rates fixed on the basis of average weight of H&K waste generated by the unit. It is the duty of hotels and restaurants to ensure only food waste to be deposited to H&K collection service while segregating dry waste for collection by Door/Gate to Dump system. Many

hotels and restaurants choose not to avail services of this collection system, thereby disposing food waste in secondary collection bins or in Door/Gate to Dump system. There is no regulatory provision to ensure that a hotel or restaurant disposes food waste in a municipal or private recycle stream. As a result, around 40 percent of total waste dumped at Pirana contains food waste (refer Figure 20) generated by residences, fruit & vegetable vendors, food stalls, hawkers and hotels/ restaurants which do not avail H&K collection service.

The private agencies use a total of 4 vehicles for collecting waste from the units. The containerised fleet is used to avoid spillage of waste while transporting. On an average, around 3 persons including the driver undertake collection. Collection is undertaken mostly in 2 trips – one in the morning and one late at night. It was reported that by the ground staff that around 70 percent of H&K waste is collected during the evening shift as most of the waste is generated towards evening. Also, lesser traffic makes it easier to collect waste at late evening/ night.

Upon collection, the H&K MSW is transported to one of the processing plants for conversion of organic waste into compost.

### Construction and Demolition MSW Collection

Ahmedabad is a fast expanding city with significant construction activity taking place in all areas. As a result, the city generates around 19,000 MT of C&D waste every month constituting around 17 percent of total waste generation in Ahmedabad.

Of this 19,000 MT, only 12,600 MT of waste is collected by AMC while the remaining is either reused for local filling in and around construction sites or is illegally dumped along the roads, open areas and low lying areas. Collection of C&D waste is based on request calls from the waste generators. Apart from that, a few fixed locations in each zone have been designated as C&D waste secondary collection points from where AMC's C&D waste collection fleet collects the waste.

As per AMC's records, AMC runs a fleet of 117 vehicles with a total capacity of 366 MT per trip for collection and transportation of C&D waste. Out of these 117 vehicles, 40 are lorries/ trucks, 65 tractor trailers and 12 tipper trucks. Collection of C&D waste is done either in response to a request by generator of the waste or collection from pre-defined points in each zone.

In addition to AMC, private contractors are also providing collection services for C&D waste, especially in peripheral areas. Such waste collected by private contractors is used locally in as construction material for land filling.

Table 73 Zone wise C&D MSW Collection (December 2011)

	CZ	WZ	NZ	EZ	SZ	NWZ	Total C&D MSW Collection	Unit
<b>Dec-11</b>	3,789	1,066	1,883	1,790	897	3,268	<b>12,694</b>	MT/Month

Source: (AMC, 2012)

Maximum C&D MSW is collected from Central Zone closely followed by New West Zone. In New West Zone, a boom in the construction activity is the cause of high generation of C&D waste. Local consumption of C&D waste in construction/ landfilling is common in New West Zone while in Central Zone, local recycling of C&D waste in Landfilling or other construction activity is limited. Hence, there is little option for C&D waste generator other than requesting AMC to collect the same. In

other zones, there is moderate construction activity and local consumption of C&D waste is common.

### **MSW Collection from Slaughter House, Meat, Fish and Special Markets**

Ahmedabad generates around 500 MT/month of waste from slaughter house, meat, fish and special markets. Ahmedabad has only one authorised slaughter house run by AMC in Central Zone. All meat is supplied in the city from this slaughter house. However, there are many other smaller unauthorised slaughter locations generating such MSW in and around the city.

AMC provides waste collection services from the only authorised slaughter house and from other AMC's meat markets only through a secondary collection point at such markets. There are many non-AMC meat and fish markets which are not covered by this service. The waste generated at such markets is disposed in either Door/Gate to Dump system or into secondary collection bins.

There is no dedicated service provided for collection of waste from fruits, vegetable and grains markets. Waste from these sources also finds way into the secondary collection bins.

For collection of waste from slaughter house, meat and fish markets, AMC has a fleet of 2 vehicles only. One van is used for collecting waste from fish market, while the other is used for collecting waste from mutton and beef market.

**Figure 34 Collection and Transportation of MSW from Fish Market**



Source: (AMC SWM Department, 2011)

During the field tracking of one of such vans starting from Teen Darwaza, it was revealed that the van did not have a closed body container for collection of waste. As a result, liquid waste (including blood) was found dripping from the vehicle while it was on the move. The staff used a tarpaulin cover over the van once it was fully loaded. The staff however was not using any appropriate protective gear while manually handling the waste and loading it into the van.

As many fish products come in thermocol boxes, large volume of such boxes were found at secondary collection point at fish market which were not picked up by the van and were burnt there itself. It was reported by the field staff that composting plant does not accept such boxes in the waste delivered to them, and hence the collection staff burns them at secondary collection points.



### Lifting of dead animals

Lifting of dead animals in Ahmedabad City area is done by AMC. Lifting of dead animals is undertaken against reports received about dead animals and from fixed locations in each zone on a daily basis. Mostly, dead animals are lifted manually and loaded into the vehicles but many times, street sweeping staff has to lift dead animals and place their bodies next to (and in many cases inside) the secondary collection bins.

In order to provide this service, the corporation has two dedicated vehicles working for 16 hours a day (2 shifts) managed by a team of 10 persons per vehicle. An order for 3 additional vehicles has been placed by AMC. AMC takes request at its control room based at Behrampura office and through AMC's website which has a section for 'Pale Depo' under complaints (refer Figure 60).

Figure 35 Van for transporting dead animals



Source: (AMC SWM Department, 2011)

### 6.5.4. Transportation of Waste

#### Transportation of MSW Collected by Door/Gate to Dump System

As discussed in the previous sections, AMC has contracted out Door/Gate collection of MSW to private agencies. Once the waste is collected from Door/ Gate using mini-vans, it is then transferred to compactors (10 and 12 MT) at depots, transfer station or along roads. The compactors then transport the waste to either open dump site at Pirana or to one of the processing plants.

In order to do so, the fleet maintained by various private agencies to carry out their services has been shown in the table below:

Table 74 Zone wise Vehicular Fleet for Door/Gate to Dump Collection undertaken by Private Contractors

Zone	Mini Vans		Compactor		Zone wise Total
	Present	Spare	Present	Spare	
Central	85	5	9	2	101
North	110	10	11	2	133
West	90	9	8	2	109
New West	109	10	10	2	131
East	80	10	7	3	100
South	80	9	7	6	102
<b>Sub Total</b>	<b>554</b>	<b>53</b>	<b>52</b>	<b>17</b>	
<b>TOTAL</b>		<b>607</b>		<b>69</b>	<b>676</b>

Source: (AMC, 2012)

**Figure 36 Compactors in Line to dump MSW at open dumping site at Pirana**



Source: UMC.

### Transportation of MSW Collected Street Sweeping

Once MSW is collected through street sweeping and from litter bins, the same is deposited in secondary collection bins. AMC has contracted out secondary collection bin lifting and transportation of the same to open dump site at Pirana partially. In addition to the bins, waste transportations from secondary collection sites without bins is also shared between AMC and private agencies. The fleet used by both AMC and private agencies for lifting and transportation of containers has been provided in the Table 75:

**Figure 37 Fleet for Transportation of MSW from Secondary Collection Bins**



Source: UMC

**Table 75 Responsibility for Zone wise Secondary Collection Sites & Containers lifting by Spot to Dump System**

Zone	AMC		Private Agency 01		Private Agency 02		Zone wise Total	
	Sites	Containers	Sites	Containers	Sites	Containers	Sites	Containers
Central	10	16	64	109	0	0	74	125
East	101	112	52	69	0	0	153	181
South	91	108	48	71	0	0	139	179
West	23	24	0	0	121	159	144	183
North	65	79	0	0	43	59	108	138
New West	35	35	0	0	25	25	60	60
<b>Total</b>	<b>325</b>	<b>374</b>	<b>164</b>	<b>249</b>	<b>189</b>	<b>243</b>	<b>678</b>	<b>866</b>

Source: (AMC, 2012)

### Transportation of Hotels' & Restaurants' Kitchen MSW

As the system of H&K MSW collection includes its transportation to processing plants, transportation details have already been covered for the same in previous sections.

### Transportation of Construction and Demolition MSW

As the system of C&D MSW collection includes its transportation to open dumping site at Pirana, transportation details have already been covered for the same in previous sections.

**Figure 38 Mechanised Fleet for Collection of C&D Waste**

Source: (AMC SWM Department, 2011)

### Transportation of MSW Collected from Slaughter House, Meat and Fish Markets

As the system of collection of waste from slaughter house, meat and fish markets includes transportation to processing plant, transportation details have already been covered for the same in previous sections.

### Transportation of MSW Collected by Lifting of Dead Animals

As the system of lifting dead animals includes its transportation to carcass dumping site near Gyaspur, transportation details have already been covered for the same in previous sections.

A summary of the total fleet maintained by AMC for carrying out the above functions has been provided in the table below:

**Table 76 Fleet and Capacity for Transportation of MSW, March 31, 2012**

Type of Vehicle	No. of Vehicles
Tipper Truck	40
Dumper Placer	105
Skip Lifter	11
Refuse Compactor	4
Dead Animal Collection Van	2
JCB Machine	17
Bobcat Type Machine	18
Bull Dozer	5
Wheel Dozer Machine	3
Heavy Duty Loader	3
Excavator Machine	4
Truck Mounted Road Sweeping Machine	2
Tractor Mounted Road Sweeper Machine	8
Door/Gate to Dump Mini Van	15

Source: (AMC Central Workshop, 2012)

### Transfer Stations

Six transfer stations are under planning in AMC with the objectives of savings in transportation cost, reduction in pollution and reducing contribution to traffic in the city. Transfer stations are being planned in five zones for handling 400 MT of MSW each. Eventually 12 stationary compactors, 60 containers (20 to 25 cu.m. capacity each) and 40 large hook loader vehicles would be required to transfer MSW from these stations to disposal site or treatment plants.

At present, one transfer station is functional but would be upgraded in the proposed scheme of zonal transfer stations. Work orders have been issued for five such transfer stations while one is in its tender stage. Operation and Maintenance (O&M) orders have been issued for 3 transfer stations.

**Figure 39 The only functional transfer station**



Source: UMC

Although the transfer stations are under various stages of planning and implementation, for the purposes of this master plan, they have been accounted as existing/ upcoming while computing future demand for the same.

**Figure 40 Equipment at Transfer Station - Stationary Compactor and Large Hook Loader Vehicle for Transfer Stations**



Source: (AMC SWM Department, 2011)

### 6.5.5. Processing of Waste

Ahmedabad has 2 operational MSW processing plants contracted out to private agencies. One of them converts MSW to compost while the other produces eco-fuel in the form of refuse derived fuel (RDF). Details of waste processed in Ahmedabad have been provided in this section below:

**Table 77 Summary of quantity of MSW processed**

Details of MSW received at Processing/ Disposal Facilities	Unit	2011
Quantity of MSW received - Processing & Recycling Facilities	Tons/ Month	10,763
Direct disposal at dumping site	Tons/ Month	97,591
Quantity of MSW taken away by recyclers from intermediate points	Tons/ Month	100
<b>Total MSW received at Processing/ Disposal Facility &amp; Recycled</b>	<b>Tons/ Month</b>	<b>1,08,454</b>

Source: (AMC, 2012)

Ahmedabad city processes 10,763 MT of MSW monthly through private agencies contracted for processing in the December 2011. An estimated 100 MT of MSW is picked up daily by rag pickers from secondary collection points and from open dumping site at Pirana. The table below provides details of existing and under construction processing facilities for MSW in Ahmedabad:

**Table 78 MSW Processing Installed Capacities and Actual MSW Received for Processing**

	Unit	2011	
Does the ULB have any MSW processing facility	Yes/No	Yes	
Are daily logs of MSW intake at processing facilities available	Yes/No	Yes	
<b>Provide MSW processing facility details as under</b>		<b>Installed Capacity</b>	<b>Current Operation</b>
Excel Industries	Tons/ Month	15,000	4,875
UPL Djai Power Ltd.	Tons/ Month	7,500	5,888
Creative Ecorecycle Port Pvt. Ltd. (I)*	Tons/ Month	24,000	-
Hanjer Biotech Energies Pvt. Ltd.*	Tons/ Month	15,000	-
<b>Total</b>	<b>Tons/ Month</b>	<b>61,500</b>	<b>10,763</b>
MSW collected by rag pickers for processing	Tons/ Month		100
<b>Total MSW Processed in the ULB</b>	<b>Tons/ Month</b>		<b>10,863</b>
Quantity of MSW rejected by processing facilities at intake point	Tons/ Month		2,166
Quantity of post-processing rejects sent to dumpsite/ landfills	Tons/ Month		

Note: \* Under construction, Creative Company's plant to be operational by January 2012 and Hanjer by March 2012.

Source: (AMC, 2012)

Details of existing and proposed MSW processing plants has been provided below:

- i. **500 MT per day of Municipal Solid Waste is converted into bio manure by Excel Industries:**  
AMC has tied up with Excel Industries, Mumbai since 2000 for processing of 500 TPD of MSW daily to promote derivation of organic manure from MSW, reduce the quantity of MSW going to landfill site and to help agricultural production. For an input of 400 MT the plant recovers 75 MT of Compost per day by Microbial Composting. AMC has provided 25 acres of land for 15 years on a yearly rent of INR 1 per sqm. Currently, this processing plant is operating at 1/3<sup>rd</sup> of its installed capacity.
- ii. **500 MT per day of MSW converted into RDF by UPL Djai Power Ltd. started since July, 2009:** The Corporation had awarded contract for setting up MSW to RDF Plant of 500 MT per day capacity on a 30 acre land given by the corporation to a private partner UPL DJAI Power Ltd. on a token lease rent for 25 years. This RDF is used in boilers as a substitute for coal, lignite, wood, oil etc. in industries. The plant has been operating since July 09, 2009. In March 2012, AMC revised the contract and with a reduction in capacity to 250 MT per day taking back 15 acres of land.

**Figure 41 MSW Processing Facilities at Excel Industries (left) and UPL Djai Power Ltd. (right)**

Source: (AMC SWM Department, 2011)

- iii. **800 MT per day of MSW converted into Energy by Creative Ecorecycle Port Pvt. Ltd. (I) (under implementation):** The plant is being set up on Financing, Building, Operating & Maintaining basis for production of Fuel Pellets / RPPWF and converts other organic MSW

into Bio-organic Soil Enricher/ Organic Fertilizer from 800 MT per day of MSW. AMC has provided land of 25 acres on a token lease rent of INR 1/- per sqm for 30 years. This plant is expected to be operational in 2012-13.

- iv. **Integrated Multi Product MSW Processing Plant by Hanjer Biotech Energies Pvt. Ltd. (under implementation):** The Integrated Solid Waste Management Plant is being set up on Financing, Building, Operating & Maintaining for the Production of Integrated Multi Products like Organic Fertilizer, Fuel Pellets, RDF etc. from 500 MT per day of MSW. Land of 50,000 sqm on a token lease rent of INR 1/- per sqm for 30 years has been delineated. The company will treat all inert/ post process MSW coming out of Excel Ind. and UPL Djai Power Ltd., hence minimization of land filling further. This plant is expected to be operational by 2012-13.
- v. **15 MT per day Proposed Processing Plant for Waste from Dead Animals:** In addition to the above, AMC has invited EOI for setting up of a plant for processing of capacity 15 MT per day of waste from dead animals. Details of the tender have been provided in Annexure 15.
- vi. **Decentralised Bio-degradable Waste Processing:** AMC started this pilot in September 2011 whereby daily garden, H&K waste and other green waste is converted into organic manure with the help of Organic Waste Converter (OWC) machines on a PPP mode. Each OWC machine of a capacity of 200 kg was installed for 60 days to test the idea. Registration of members was initiated with a credit point system whereby 30 percent of the waste deposited by members would be converted to organic manure and provided free of cost.

Figure 42 Organic Waste Converter (50 kg Batch Size)



Source: (AMC, 10 Initiatives taken by AMC for Solid Waste Management in Ahmedabad, 2012)

- vii. **Augmentation of processing capacity by 1,500 to 2,500 MT per day by AMC:** AMC is planning augmentation of its processing capacity through private service providers. AMC is in the process of evaluating offers received for the same. After further negotiation, one or more service providers would be finalised out of the three shortlisted service providers.
- viii. **500 MT per day Under Consideration Plant for Converting C&D Waste into Tiles and other Construction Material:** AMC has floated EOI inviting private agencies to setup a processing plant which can convert C&D waste into useful construction material like paver tiles.

Upon implementation of all of the above, combined installed capacity of all processing plants would be as follows:

**Table 79 MSW Processing Capacity - Existing, Under Implementation and Under Consideration**

Processing Plant	Processing Type	Capacity (MT/Month)
<b>Existing</b>		
Excel Industries Pvt. Ltd.	Organic Composting	15,000
UPL Djai Power Ltd.	Conversion to RDF	7,500
<b>Under Implementation</b>		
<b>Creative Ecorecycle Port Pvt. Ltd. (I)</b>	Organic Composting & Fuel Pellets	24,000
Hanjer Biotech Energies Pvt. Ltd.	Organic Composting, Fuel Pellets, RDF	15,000
<b>Proposed/ Under Consideration</b>		
For MSW from Dead Animals	-	450
Decentralised Bio-degradable Waste Processing	Organic Manure Conversion	360
Augmentation of Processing Capacity by AMC	Various	45,000 to 75,000
For C&D Waste	Conversion to paver tiles	15,000
<b>TOTAL</b>		<b>120,000 to 150,000</b>

Source: (AMC, 2012)

As of December 2011, Ahmedabad generated 110,667 MT/month of MSW and the total capacity of processing MSW is likely to be 114,810 MT/month. However, as of December 2011, MSW processing was 69,000 MT. The table below shows the projected gaps in MSW processing capacity.

**Table 80 Existing and Projected Gaps in MSW Processing Capacity**

Year	2011	2016	2021
Waste Generated (MT/Month)	110,667	137,874	171,768
<b>MSW Processing Gap (MT/Month)</b>	<b>45,810*</b>	<b>23,064</b>	<b>56,958</b>
<i>Note: * Existing MSW processing capacity is only 69,000 MT. It is assumed that by 2016 all under implementation, proposed and under consideration processing facilities would be implemented fully.</i>			

Source: UMC

As evident in the table above, MSW processing gap by 2031 would be around 150,000 MT/month.

### 6.5.6. Disposal of Waste

Earlier, AMC used to resort to open dumping at Pirana. Around 97,500 MT/month are disposed at Pirana open dump without any treatment. Untreated and mixed waste disposal attracts waste pickers to the site in large numbers who manually segregate anything sellable in the recycling market. Some of the materials that are segregated are plastic, metal, fabric, footwear, electricals and even human hair (refer Figure 45). The figure below shows a view of the Pirana open dump site.

Figure 43 Open Dump Site at Pirana



Source: UMC.

AMC has constructed a new scientific landfill site at Gyaspur having an area of 12.88 ha with a capacity of 11.50 lakh MT (i.e. 1.15 million tons). This would enable use of this site for the next 6 years with a daily off load of 500 MT of inert MSW from MSW processing plants. AMC has also earmarked land of 68 ha for future need of 30 years in 5 phases. The site's construction was completed and has been put in use since October 14, 2009. The surrounding infrastructure like, roads, light, storm water & drainage lines, fencing, security & administration block, vehicles & machineries procurement and O&M, washing facility & parking area, leachate well with connection to nearby STP are under planning and will be operational soon. INR 12 Crores have been funded under JnNURM for the same.

At the scientific disposal site at Gyaspur, around 2166 MT of inert waste was disposed in December 2011. With operationalisation of all proposed processing plants by 2012-13, this volume is likely to increase. The scientific landfill site is designed to handle upto 15000 MT of MSW monthly or 500 MT per day. The remainder of MSW collected (around 97,500 MT of untreated MSW) is being disposed at open dumping site at Pirana.

Figure 44 Scientific Landfill Site at Gyaspur



Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)



### 6.5.7. Staff and Management of SWM Department

#### Conservancy Department

Number of staff in Conservancy Department has been given in the tables below.

**Table 81 Staffing of Conservancy Department**

At Zonal Level		At Ward Level	
Deputy Health Officer	1	Public Health Supervisor (PHS)	1
Assistant Health Officer	1	Sanitary Inspector (SI)	1 or 2
Sanitation Superintendent	1	Sanitary Sub Inspector (SSI)	3 or 4
		Mukadams & Safai Kamdars	

Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)

**Table 82 Zone wise staffing of Conservancy Department**

Zone	Permanent Sweepers	Daily Wage Sweepers	Total Sweepers	Mukadams (Supervisors)	SSI	SI	PHS
Central	2,028	336	<b>2,364</b>	31	39	15	10
East	1,297	707	<b>2,004</b>	17	45	20	13
West	1,388	421	<b>1,809</b>	36	46	17	10
North	1,644	172	<b>1,816</b>	32	48	20	13
South	1,226	508	<b>1,734</b>	16	43	18	11
New West	166	2,932	<b>3,098</b>	0	55	19	13
<b>Total</b>	<b>7,749</b>	<b>5,076</b>	<b>12,825</b>	<b>132</b>	<b>276</b>	<b>109</b>	<b>70</b>

Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)

#### SWM Department

Number of staff in Conservancy Department has been given in the tables below.

**Table 83 Central Level Staff Positions in SWM Department**

Central Positions	Number
Director (SWM)	1
Deputy Director	1
Assistant Manager	1
Solid Waste Superintendent	2
Assistant Engineer	1
Environment Engineer	1
Public Health Supervisors	4
Sanitary Inspectors	11
Sanitary Sub Inspectors	33
SWM Workers	529
<b>TOTAL</b>	<b>584</b>

Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)

### 6.5.8. Private Sector Participation in Solid Waste Management Services

#### Collection & Transportation

AMC has privatized collection, lifting and transportation of special category MSW on service type contract. Details of these contracts have been summarised in the table below:

**Table 84 Existing Private Sector Participation in Solid Waste Management, 2011**

S. No.	Service Contracted	Contract Type	Contract Period	Mode of Operation
1	Door/ Gate to Dump	Service		AMC pays the service provider based on the weight of MSW & weighed at AMC's weigh bridge. No capital investment by AMC.
2	Hotels' and restaurants' kitchen MSW collection (on Polluters Pay Principle <sup>12</sup> )	Service	5 Years	No cost to AMC. All capital & O&M costs borne by service provider.
3	Hospital MSW collection	Service	10 Years	AMC pays the service provider based on the weight of Bio Medical MSW collected from municipal medical facilities. No capital investment by AMC.
4	Collection, lifting, transportation & disposal of 7 cu.m. M S Containers with dumper placers	O&M Contract	5 years	All capital investment for vehicles & equipments by AMC; operation by service provider
5	Spot to Dump lifting and transportation	O&M Contract	-	All capital investment for vehicles & equipments by AMC; operation by service provider

Source: (AMC, Solid Waste Management & Conservancy Services, Presentation, 2011)

#### Door/ Gate to Dump MSW

AMC has contracted residential and commercial MSW collection and transportation to 4 private agencies with 2 agencies covering 2 zones each while the remaining 2 covering 1 zone each. AMC has not made any capital investment but pays the private service provider according to the weight of the bio-medical MSW collected. Detail of the payments done to private agencies in the last 2 years has been shown in the table below:

**Table 85 Payments made to Private Service Providers under the Door/Gate to Dump System**

Year	Total
2010-11	9.44
2011-12	28.36
<i>All figures in INR Crores</i>	

Source: (AMC SWM Department, 2011)

<sup>12</sup> Rates to be charged by service providers have been fixed by AMC based on the distance from the processing plant. The rates are 27 paisa for West & New West Zones; 49 paisa for Central & South Zone and INR 1 for North & East Zone.

Hotels' & Restaurants' Kitchen MSW

AMC has contracted H&K MSW collection and transportation to 2 private agencies with 1 agency covering 2 zones while the other covering 4 zones. AMC has applied 'Polluters Pay Principle' for H&K MSW and has fixed charges (per kg of H&K MSW) for collection of the same by private agencies. The rates fixed per kg are 27 paise for West & New West zones; 49 paise for Central & South zones and INR 1.00 for North & East zones. There is no payment either in the form of capital or O&M being given to the service providers.

Bio Medical MSW

For Bio Medical Waste (BMW), AMC has employed private sector for collection, transportation, treatment and disposal of bio-medical MSW from municipal medical facilities. AMC pays the private service provider according to the weight of the bio-medical MSW collected. To understand the scale of this service, payments made to the private service providers over the last 7 years have been shown in the table below:

**Table 86 Payment made for Collection, Treatment & Disposal of Bio-Medical Waste since 2005-06**

Year	No. of AMC Units Covered	Collection of BMW (MT)	Amount Paid (INR in Lakh)
2005-06	48	347.3	42.88
2006-07	59	354.1	43.46
2007-08	59	281.8	34.32
2008-09	59	213.3	25.58
2009-10	68	235.1	28.31
2010-11	68	252.6	30.45
2011-12	68	310.4	37.68

Source: (AMC SWM Department, 2011)

Container Lifting

In order to empty the 7 cubic metre MS containers located in different parts of the city, AMC has shared the task with 2 private service providers. For this service, AMC has made the capital investment including purchase of MS containers and vehicles (dumper placers) for clearing the containers have been provided to the private agencies on O&M contract. The private agencies are paid based on fixed component (number of containers lifted) and variable component (the distance travelled by the vehicle to and fro). The rate for lifting of each container is fixed at INR 350 and the variable component is calculated at INR 11.77 per km of distance travelled by the vehicle. The payments made by AMC to private agencies in the last 3 years have been provided in the table below:

**Table 87 Payments made to Private Service Providers for Container Lifting**

Year	Payments to Private Agency 1	Payments to Private Agency 2	Total
2009-10	0.37	0.28	0.65
2010-11	1.85	2.42	4.27
2011-12	2.48	3.26	5.74

*All figures in INR Crores*

Source: (AMC SWM Department, 2011)

Spot to Dump

There are around 237 nuisance spots in the entire city of Ahmedabad (refer Table 70). AMC has contracted out cleaning of these spots to private agencies. 'Spot to Dump' system follows the same

model as container lifting whereby all capital expenditure is done by AMC and O&M has been contracted to private agencies. In 'Spot to Dump' system, AMC pays the private agency based on the weight of MSW cleared from the spots. Payments made under this system have been shown in the table below:

**Table 88 Payments made to Private Service Providers under the Spot to Dump System**

Year	Payments to Private Agency 1	Payments to Private Agency 2	Payments to Private Agency 3	Total
Jul 2011- Mar 2012	0.572	0.630	1.27	2.47
<i>All figures in INR Crores</i>				

Source: (AMC SWM Department, 2011)

### **MSW Processing & Disposal**

AMC has contracted out processing and treatment of various types of MSW to private agencies. There are 2 existing MSW processing agencies providing their services to AMC for compost and RDF generation for MSW. As of now, there is no private sector participation for processing or treatment of special waste like MSW from dead carcasses, C&D MSW, etc. In the future, AMC wishes to engage private sector in processing of C&D MSW, dead animal carcass, MSW from slaughter house, meat & fish markets and any other type of special MSW that may be generated in the city.

### **Future of Private Sector Participation in SWM Services**

AMC has been exploring possibilities of private sector participation in SWM services to improve the services and reduce the burden on the municipal machinery. Based on discussions with SWM Department the private sector participation in the future would continue in its existing form except for elimination of 'Spot to Dump' service as all nuisance spots would be converted to container sites.

In order to effectively implement and manage private sector participation, a meticulously designed monitoring mechanism integrated with MIS is essential.

### **6.5.9. Service Level Benchmarking and Gaps in Solid Waste Management Services**

There are 8 major SLB indicators listed below in the table with their values as per 2008-09 and 2010-11.

Based on the infrastructural provisions and service delivery records maintained by AMC, the gaps in the same for solid waste management services has been summarised below:

**Table 89 Service Level Benchmarking in Solid Waste Management and Gaps in Service Delivery**

Performance Indicator	Benchmark	2011-12 (Dec 11*)	2011-12 (13 <sup>th</sup> FC**)
Household level coverage of SWM services through door to door connection	100%	94	99.5
Collection efficiency	100%	98	99.5
Extent of segregation of municipal solid waste	100%	13.4	30
Extent of recovery of MSW collected	80%	9	80
Extent of scientific disposal of municipal solid waste in landfill sites	100%	2	10
Extent of cost recovery in solid waste	100%	13	90
Efficiency in collection of SWM charges	90%	78	93
Efficiency in redressal of customer complaints	80%	100	98
<b>Note: * As calculated based on data received from AMC.</b>			
<b>** As submitted for 13<sup>th</sup> Finance Commission by UD&amp;HD, Govt. of Gujarat.</b>			

AMC has achieved 94 percent door to door/gate to gate collection though privatisation of this function. AMC has also achieved collection efficiency of 98 percent. By outsourcing door/gate to dump functions, AMC plays a monitoring role over the private agencies. Presently, there is MSW treatment and processing installed capacity of 30,000 MT, i.e. approximately 33 percent of the total MSW generated. However, by 2012-13, this would increase to 69,000 MT, i.e. over 77 percent of total MSW generated in the city.

#### 6.5.10. Issues in Solid Waste Management Services

The key issues identified in service delivery of solid waste management services have been categorised and presented below:

##### Segregation of MSW

Various issues identified related to segregation of waste have been listed below:

- Various levels of manual segregation exists but no mechanism to monitor for prevention of this environmentally unsafe and hazardous practice prohibited by MSW (M&H) Rules 2000
- As per AMC, segregation of domestic MSW at source is not a practical option and hence, AMC wishes to design MSWM system to manage mixed waste from households and shops. This would entail loss of valuable recoverable materials from the waste.
- Parallel to the well established informal recyclers system, AMC has initiated Wealth out of Waste (WoW) competing with traditional *pastiwalas*. The system may pose a threat to well established recyclers chains.
- There is no regulatory control mechanism for existing recyclers' chains. Severe exploitation and malpractices such as child labour are prevalent at such places. This has flourished in the absence of any segregation being promoted at source.
- There are negligible efforts being taken at municipal level for main streaming of waste pickers. However, AMC is exploring possibilities of doing so.
- As per waste characterisation survey conducted by Abellon Clean Energy in February 2010 at Pirana dump site, food waste constituted around 40 percent of the sample tested. There is no mechanism in Ahmedabad for ensuring recycling of food waste. Moreover, there is no encouragement for recycling food waste. Countries across the world are taking recycling of food waste with utmost seriousness.

- A lot of dry recyclables have been observed getting mixed in H&K collection stream and hence making processing of the same inefficient (refer Figure 21).
- Manual segregation by Door/Gate to Dump staff can be observed with gunny bags tied to the vehicles where dry recyclables are stored for selling to recyclers
- Manual segregation can be observed being undertaken by waste pickers from secondary collection points (refer Figure 45).
- Poor monitoring of private agencies resorting to unauthorised manual segregation from various levels including primary collection, transportation vehicles, secondary collection points, etc.
- As per Plastic Waste Management and Handling Rules, 2011- AMC has to ensure safe collection, storage, segregation, transportation, processing and disposal of plastic waste. However, currently, no separate provision for the same has been enforced.
- No separate system has been enforced for collection of batteries as per the Batteries (Management and Handling) Rules, 2001

**Figure 45 Informal & unauthorised segregation of MSW at various from collection to disposal**



1 – Waste segregation while street sweeping; 2 – Segregation at secondary collection points; 3 – Manual segregation at recyclers near Pirana dumping site; 4 – Segregated human hair being sold at Pirana dumping site; 5 – Segregated waste collected by a waste picker at Pirana; 6 – Waste picker segregating and collecting footwear at Pirana.

Source: UMC

### Door/Gate to Dump Collection in Residential, Slums and Commercial Areas

Various issues identified related to Door/Gate to Dump Collection have been listed below:

- i. Although, waste generated from residences and commercial areas is 57 percent of all waste, the waste collection through Door/Gate to Dump system from residences and commercial areas is only 35 percent. This implies that many households are either not covered by door/gate to dump service or despite coverage, they throw waste in community bins.
- ii. Due to implementation of Door/Gate to Dump system, there is heavy reliance on residential society/ RWA workers to collect waste from households and deposit at respective gates of societies. Any delay/ non-compliance lead to failure of Door/Gate to Dump collection service and waste is stored for more than a day at the gates.
- iii. The cost of door step collection which was earlier paid by AMC to RWAs (upto INR 20/- per household per month) has now been transferred to individuals/ residential societies.

- iv. In order to align with the Gate to Gate collection system, residential societies/ apartments have encroached upon public space – roads and footpaths, to dump waste or create caged enclosures for storing garbage bins (refer Figure 26) rather than keeping the bins within their premises.
- v. In areas which do not have RWAs/ societies, it is responsibility of the citizen to bring waste at the designated time to gate/ pre-defined point daily. In slums and chawls, this system forces citizens to carry waste for considerably long distances. Also, it may not be possible for all households to deposit waste at the gates at fixed timings daily.
- vi. In commercial areas, timing of MSW collection is not convenient as shops are swept during morning hours and collection from many commercial areas is undertaken during evening. As a result, commercial establishments store waste on footpaths and roads outside their shops (refer Figure 29).
- vii. Transfer of waste from small vans to compactors has been observed happening along roads
- viii. Despite GPS provisions in contracts of private agencies for Door/Gate to Dump collection, GPS devices are either not installed or not operational. In the absence of operational GPS enabled fleet, monitoring of vehicles cannot be done to ensure timely coverage to all areas.
- ix. The design of primary collection fleet is not user friendly forcing workers to come in direct contact with MSW while emptying garbage bins (refer Figure 27 and Figure 46). During the field visits it has been observed that it takes more than one person to empty bins into mini-vans.
- x. The fleet is not designed to collect and transport waste in a segregated manner.
- xi. Municipal/ contracted staff often violates recommendations of CPHEEO Manual for SWM including manual handling of waste for loading of waste into vehicles. Also, it is rare to see workers wearing safety kits and protective gear.

**Figure 46 Door/Gate to Dump Collection System**



Source: (AMC SWM Department, 2011)

### Issues related to MSW Collection through Street Sweeping & Litter Bins

Various issues identified related to Street Sweeping & Litter Bins have been listed below:

- i. Despite adequate number of sweepers, many small piles of garbage can be observed in the city
- ii. As many roads do not have a paved edge, dirt and stones are collected with great difficulty and poor output. Despite sweeping, the soft edges accumulate more garbage than otherwise.
- iii. During monsoons, street sweeping is very difficult, especially in areas which have unpaved edges.

- iv. Timing of morning street sweeping coincides with school traffic hours and morning peak traffic hours. Efficiency of sweepers is hampered during these times while creating hazardous conditions for sweepers, and causing hindrance to traffic movement.
- v. Manual handling of street swept waste is common (refer Figure 48) and use of proper equipment is limited. Equipment design and maintenance is also reported to be poor.
- vi. There are around 500 open defecation spots in the city (AMC, 2010) and many of them are along footpaths and roads. Sweeping such stretches of roads is a problem forcing the sweepers to manually clean human excreta violating Supreme Court orders against manual scavenging.
- vii. Improvisations in design of the handcarts can be observed by sweepers in order to collect dry recyclables for selling in the recyclers markets as shown in the figure below.

**Figure 47 E-waste in Street Sweeping (left); Improvisation in handcart to segregate dry recyclable waste (right)**



Source: UMC

- viii. Many handcarts are left overnight along the roads filled with garbage causing inconvenience and attracting stray animals
- ix. Design of secondary container bins is not appropriate for manual emptying of small bins placed in the handcarts. The high opening in the container forces the sweeper to lift the small bins over their shoulders or empty the waste using bare hands as shown in Figure 48.

**Figure 48 Manual Emptying of Street Sweeping cart (left); High opening of Secondary Bin (right)**



Source: UMC

- x. There is no spatial database with AMC to plan and monitor routes and road lengths covered by each sweeper. In the absence of such database, efficient management is not possible.
- xi. According to Navsarjan, sub-contracting of sweeping is a common practice in most large cities including Ahmedabad. This practice is not formally approved and may affect the accountability of the sweeper and sincerity with which tasks are carried out. Further, there are territorial divisions of areas for street sweeping made by informal groups.
- xii. No demand assessment of litter bins has been conducted by AMC. Placing of litterbins has been done based on isolated projects and schemes and are not coordinated at city level.
- xiii. Litter bins are highly inadequate, especially in public areas including transit zones.



- xiv. Most of the litter bins installed are severely damaged or completely missing.
- xv. No maintenance schedule – cleaning, washing, rinsing, repainting, etc. is being done to the existing litter bins
- xvi. There are no scheduled repairs and/or replacements of litter bins being carried out by AMC
- xvii. During field visits, litter bins were found to be very dirty as placing garbage bags in litter bins is not practiced in Ahmedabad.
- xviii. Capacities of litter bins placed are not according to the waste generation at that spot

#### Issues related to Hotels' & Restaurants' Kitchen MSW Collection

- i. Coverage of H&K collection is very poor in the city – with less than 45 percent formal hotels and restaurant covered out of a total of 2300 units.
- ii. There is no coverage for food stalls, roadside food vendors, hawkers, formal and informal neighbourhood fruits & vegetable vendors.
- iii. Zonal variation in coverage can also be observed. During the field visits conducted for tracking H&K waste, it was reported that due to narrow streets, traffic congestion and scale of hotels and restaurants, coverage in Central Zone is very low as compared to West and New West Zones. In West and New West Zones, average size of hotels and restaurants, and thus H&K MSW generated per unit is more making it profitable to increase coverage in such zones.
- iv. Use of H&K collection system is voluntary for hotels and restaurants. There is no regulatory provision with AMC to ensure that H&K collection system is mandatorily used.
- v. In case of non payment by hotels/ restaurants, private agency responsible for collecting kitchen waste from them discontinues the service and hence, such units deposit waste either in secondary collection bins or to Door/Gate to Dump collection system.
- vi. The number of vehicles is sufficient by volume of waste, but in order to achieve coverage, more number of smaller capacity vehicles may be required. The large vans may not be able to access narrow lanes, especially in Central Zone.
- vii. Not all hotels and restaurants store H&K waste in garbage bags. This forces the H&K collection staff to manually pick waste strewn on ground into garbage bags. In many cases, it was found that due to excessive filling, garbage bags tear open spilling waste while loading.

Figure 49 Mixed Food & Dry Waste (left); Food Waste being Collected from Ground



Source: UMC

- viii. The design of the fleet used for collection is inappropriate for H&K waste. The closed container vehicles with rear opening doors hinder full use of volume of the vehicle. Moreover, high floor makes loading the waste also difficult requiring more than 2 person to lift garbage bins/ bags atleast upto shoulder height.

- ix. Due to poor fleet design, workers have to enter the waste storage compartment and manually stack garbage over one another bringing them in direct contact with the waste.
- x. Protective gear/ equipment is not used by staff collecting the waste.

**Figure 50 Inappropriate fleet design - Inconvenient loading (left & centre); Manual stacking of garbage bags (right)**



Source: UMC

### Issues related to C&D MSW Collection

- i. As reported by AMC, C&D waste collection system is a call based system where the waste generator can request collection by AMC. However, upon calling the toll-free number of AMC and zonal office number for collection of C&D waste, complaints cell was not aware of any such call based system for C&D waste. The staff at central and zonal level did not have information regarding C&D waste collection charges. Internal requests/ information flow within AMC was found to be ineffective.
- ii. In the absence of a robust mechanism of surveillance, many C&D waste generators often dump waste in vacant plots, open spaces, low lying areas, along roads, etc. (refer Figure 51).
- iii. Most of the vehicles in the fleet for collection of C&D waste do not have vehicle mounted cranes and hence manual loading is required making the process inefficient and time consuming.
- iv. Moreover, in the absence of vehicle mounted cranes, it becomes responsibility of the waste generators to provide manual labour for loading the waste onto vehicles.

Figure 51 C&amp;D MSW Disposed by Generators on Public Footpaths &amp; Roads



Source: UMC

#### Issues related to MSW Collection from Slaughter House, Meat, Fish and Special Markets

- i. Collection of waste by this system is restricted to clearing waste from secondary collection points only and not through door step collection from meat/ fish/ vegetable/ fruit shops. In the absence of door step collection, meat/ fish waste can be seen everywhere in the meat markets (refer Figure 52).
- ii. Waste collected from slaughter house, meat and fish markets is only 108 MT/month against generation of around 500 MT/month. The remaining of the waste is disposed either through Door/Gate to Dump system or into secondary collection bins.
- iii. Waste from non municipal meat markets and other slaughter houses is not collected.
- iv. Fruits, vegetables and grain markets are not covered by AMC at present. Waste from such special markets is also disposed in a similar fashion.
- v. The fleet for collection of such waste is inadequate and poorly designed with no facilities for mechanised loading, closed (leak proof) body, etc. causing nuisance on roads as liquids drip out. It requires a person to mount into the vehicle for loading large garbage bins/ bags into the vehicle.
- vi. Thermocol boxes used for fish packaging are burnt regularly at the secondary collection points at meat/ fish markets in violation of CPHEEO's Manual for SWM.
- vii. The collection staff is not equipped with appropriate protective gear for handling the waste and manual handling is common.

**Figure 52 Meat waste littered in market (including blood and faeces of animals)**



Source: UMC

#### **Issues related to Lifting of Dead Animals**

- i. Lifting of dead animals is done by manually loading the dead body in the vehicle.
- ii. Many times, street sweepers lift, transport and deposit small dead animals (like dogs and cats) inside or next to secondary collection bins where they maybe left unattended for a day. As an informal arrangement, street sweeper who picks up the dead animal is allowed to go off-duty for the remainder of that day.
- iii. Dumping of dead animals in secondary bins was observed at Ram Rahim Tekro, Behrampura and similar practice was reported in other parts of the city as well.
- iv. The staff does not use appropriate protective gear and equipment for lifting and loading of dead animals in collection vehicles.
- v. Informal system of collection of dead animals is done in unscientific manner and disposed in the open giving access to people (including children) scavenging body parts (refer ).

#### **Issues related to Transportation of MSW**

- i. Transfer of MSW from Door/Gate to Dump mini-vans to compactors takes place along roads in many areas causing severe inconvenience.
- ii. Many vehicles can be seen on road transporting MSW in partially covered manner with waste flying out on the move.
- iii. No/ minimal monitoring of fitness condition of vehicles is done by AMC. Many vehicles with broken containers, improvised closing lids, sharp protruding objects, non-functional electrical functions can be observed.

### Gaps in MSW Collection & Transportation Services

Based on continuation of the existing system of MSW collection, gaps for the same have been calculated for each category of waste below:

**Table 90 MSW Collection & Transportation Gaps till 2031**

	Unit	2011			2016		2021	
		Delivery	Demand	Gap	Demand	Gap	Demand	Gap
<b>Door/Gate to Dump</b>								
Mini vans for door to door collection	No.	631	624	-	778	147	969	338
Refuse compactors for transferring waste upto dump site	No.	Not required as Mini-vans to transport MSW directly to transfer stations						
<b>Street sweeping</b>								
Handcarts for street sweeping	No.	8,500	11,435	-	13,335	4,835	15,551	7,051
Protective Gear for Street Sweepers	No.	-	24,948	24,948	1,16,377	1,16,377	1,69,647	1,69,647
Road Vacuum Sweeping Machine <sup>13</sup>	No.	18	13	-	15	-	17	-
7 cu.m. MS Containers	No.	866	866	866 containers to be retained. No new purchase.				
1100/ 600 litres trolley bins (plastic) <sup>14</sup>	No.	-	2,322	2,322	11,462	11,462	17,501	17,501
Dumper placers for 7 cu.m. container lifting	No.	130	145	15	145	15	145	15
Refuse Compactors for clearing plastic trolley bins	No.	48	39	-	48	-	59	11
<b>Hotel &amp; Kitchen waste</b>								
Vans for collection	No.	11	4	-	5	-	6	-
<b>Meat market, Slaughter house, fish market waste</b>								
Vans for collection	No.	2	7	5	7	5	7	5
<b>Dead animal waste</b>								
Vans for collection	No.	5	5	-	5	-	5	-
<b>C&amp;D waste</b>								
Tipper Trucks	No.	104	16	-	20	-	24	-
<b>Infrastructure &amp; Equipment at Transfer Stations</b>								
Large hook loader vehicles,	No.	0	28	28	30	30	43	43

Source: UMC, 2012

<sup>13</sup> Existing number of road vacuum sweeping machine has been retained till 2031 and road length cleaned by them has not been considered for manual cleaning.

<sup>14</sup> Average life of each plastic container is 1 year. Hence, proposed procurement accounts replacement of containers every year.

### Issues in MSW Processing In Ahmedabad

- i. Despite installed capacity of 30,000 MT/month only around 10,000 MT/month is being processed by the 2 operational processing plants. Reasons cited by processing plant operators are poor quality of MSW, i.e. mixed waste being supplied which is neither efficient for composting, nor for manufacturing RDF.
- ii. At present, the city is highly deficient in overall MSW processing capacity with an existing gap of around 46,000 MT/month.
- iii. Although segregated MSW is being collected for H&K, dead animals, meat waste and C&D waste, no processing facility for the same is available.
- iv. Without segregation at source, future possibilities of organic composting at city level would be severely restricted. As per waste characterisation survey, nearly 40 percent of waste reaching Pirana open dump comprises of food waste.
- v. Ahmedabad has a huge pile of legacy waste dumped at Pirana waiting to be processed. Over the years, valuable energy tapping opportunities from the legacy waste have been lost.

### Issues in MSW Disposal In Ahmedabad

- i. Without segregation at source, as per waste characterisation survey, nearly 40 percent of waste reaching Pirana open dump comprises of food waste.
- ii. Short cut method of mixed waste dumping in the open is encouraging waste picking exposing waste pickers to extreme health and safety hazards.
- iii. Uncontrolled open burning of MSW can be observed at Pirana as well as many other secondary locations in the city.
- iv. Open dump site at Pirana with unprocessed MSW is causing pollution in and around the site including residential and industrial areas.
- v. Percolation of liquids into ground water through the open dump site has been polluting ground water sources for years.
- vi. Ahmedabad has a huge pile of legacy waste dumped at Pirana waiting to be processed. Over the years, valuable energy tapping opportunities from the legacy waste have been lost.
- vii. Technological options for legacy waste are limited at the moment.

### 6.5.11. Ongoing Initiatives of AMC in SWM Services

#### Ongoing Initiatives

There are various ongoing initiatives in Ahmedabad for provision of solid waste management infrastructure and for creating awareness. Some of them have been listed below.

#### Information, Education and Communication (IEC) Campaign for Sanitation

In its endeavour to keep the city clean, AMC is of the view that in parallel to investments and regulations; IEC (Information, Education and Communication) campaign is an important element to improve city Solid Waste Management. AMC has initiated an IEC Campaign through various mediums including:

- Door to Door Awareness campaigns (handouts/ paper bags with messages/ stationary with messages);
- Public events (Environment day, Health day, Clean-up drives, Ward Sabha etc.);
- Competitions, awards for localities, public places, malls, innovative initiatives;
- Capacity building of staff and other informal stakeholders through onsite and offsite training and visit to best practices, and
- Mass Communication tools like Rallies, Street Plays, Skits, Hoardings, Banners, Theatres, Radio Jingles, Local Cable Network, Telephone Ringtones/Jingles tie-up with Telecom Companies, Lectures at schools and colleges. Some samples of print content designed for the same has been provided in Annexure 13.

#### Preparation of Solid Waste Master Plan for 2031

AMC has entrusted Urban Management Centre, Ahmedabad for preparation of master plan for making Ahmedabad as a 'Zero Waste' city by 2031. Under this master plan, UMC is formulating strategy to achieve zero waste status by adopting a 3 pronged strategy of i) improving technology and infrastructure adopted by AMC for SWM, ii) introducing innovative mechanisms including real time monitoring and surveillance using integrated GIS and MIS, and iii) advocating for national, state and city level regulations for creating a sound material cycle society in Ahmedabad. Extensive process mapping, stakeholder consultation and technical studies are supporting the master plan preparation process.

#### Preparation of SWM Bylaws

AMC has initiated preparation of SWM Guidelines as a road map towards creating standards and norms at the local level for various SWM processes. Guidelines would also deal with violations and fines, obligatory responsibilities of AMC, waste generators and service providers of solid waste management.

#### Plastic Ban

The guidelines by Union Ministry of Environment and Forests (MoEF) have clearly outlined the role of the local civic body. The guidelines mention that polythene bags below 40 microns should be completely banned while those above this thickness can only be sold at a rate which is to be fixed by the local body. AMC has stringently taken action to ban manufacture, trade use and sale of prohibited plastics bags. The table below shows action taken by AMC for the same:

**Table 91 Action taken by AMC since April 01, 2011 to enforce plastic ban (2011-12)**

Particulars	Number
Number of Notices Issued	3,870
Number of Units Sealed	0
Plastic Seized (Kg)	17,894
Administrative Charges (INR)	9,19,410

Source: (AMC, 2012)

### Proposed Capping of Open Dump Site at Pirana

Over the years, AMC has been disposing MSW in open dumping site at Pirana. Out of 84 acres, around 65 acres of land has 20 to 25 metre high heaps of garbage stocked. There is potential to tap methane gas generated from these heaps and hence USEPA has undertaken a pilot project in the year 2007 for measuring the percentage level of methane concentrations found; estimated at about 950 cu.m. daily. On an average, landfill gas contains 45 to 55 percent of methane. The gas collected can then be sold off to nearby industries as raw fuel. Many industries have shown interest in using the recovered methane gas. Alternatively, captured methane gas can be processed, purified and converted into electricity. While capping the heaps of garbage for capturing methane gas, AMC plans to build nature park/ green park over the dump site.

**Figure 53 Conversion of dump site to nature/green park post capping for methane generation**

### Eradicating Open Defecation (OD)

AMC recently conducted a study on open defecation through survey of OD sites. The study was undertaken over a period of 20 days. The general observations and areas of concern identified by the survey agencies have been listed below:

- Living conditions of people residing, working and commuting near Open Defecation Spots.
- General Public Health & Hygiene of the area
- Privacy of the women defecating in open
- Bird and cattle menace due to open defecation
- Contamination of ground water due to open defecation
- Air Pollution due to bad odour on account of open defecation.
- In spite of good pay & use facility people defecate in open along the Railway lines.
- In some Public Toilets, there is acute shortage of water supply due to which Safai Kamdars are not able to clean the toilets regularly. The drainage lines remain choked.
- Around 60 to 70% of the public toilets in North zone are not cleaned regularly.
- In spite of sanitation facilities at home and good pay and use facilities, children defecate in open habitually



- Safai Karmacharis in some wards do not receive Safai equipments, and where the equipments are provided the Safai Karmacharis don't use it.
- Lack of awareness of public health and hygiene is single most important factor of open defecation.
- Timings of Pay and Use Toilets are a major concern, as very few pay and use toilets remain open for 24 hours.
- Public Toilets are not maintained properly, especially in east zone.
- Around 40% to 50 % nuisances are done by the children since they are not allowed in Public Toilets.

The suggestions of the study have emerged as follows:

- Creating awareness by IEC activities in communities
- AMC should construct adequate number of public and pay and use toilets for the people residing in areas susceptible to OD, especially along the railway line.
- After these facilities are provided, AMC should get in dialogues with Railway Authorities to make them aware about provision of such facilities and also to draw their attention towards taking adequate measures to restrict/prevent people trespassing for the purpose of OD along with the Railway Line.
- Awareness of children in schools (*Anganwadi's*) and community is very important as in spite of sanitation facilities available at home or community, they defecate in open.
- It is also suggested that OD needs to be controlled by enforcement where it is done in some private properties
- Adequate and regular water supply at pay and use toilets should be ensured.
- An immediate requirement of cleaning or construction of new drainage lines to avoid the problem of overflowing of choked drainage.
- More vigilant supervision over Maintenance and regular day to day cleaning of Pay and Use and Public toilets.
- Requirement to increase no. of seats and urinals at pay and use toilets.

AMC has taken initial steps towards complete removal of OD in Ahmedabad through this detailed study outlining the actions to be taken to achieve the objectives of the study. With effective infrastructural on-ground implementation, IEC programmes and strict enforcement, AMC hopes to make Ahmedabad an OD free city in the future.

### **Green Waste Processing**

AMC has tied up with a private company to set up a demo/ pilot project for 60 days in Law Garden area to convert the garden waste, green waste coming from nearby hotels' & restaurants' kitchen MSW, waste given by the citizens at the site into the compost. The company operating the plant would give back the compost to the citizens free of cost in the proportion of conversion ratio from waste to compost. Regular supplier of green waste may become a member of this Eco Club and will grow this concept. AMC has its own 200 public gardens and if this concept turns to be successful, then the same can be replicated elsewhere.

### Wealth Out of Waste (WoW) Initiative

The project aims at segregating solid dry recyclable waste at source including paper, plastic, metals, glass, etc. The scheme is based on private agencies collecting such segregated waste from households, shops, offices, etc. and paying a sum based on fixed rates to the waste provider. The collection agency would further provide the dry recyclable was to various recycling industries.

### E-Waste Management

For effective implementation of E-waste (Management and Handling) Rules, 2011 in Ahmedabad, AMC in coordination with GPCB and with the help of Corporate Sector, plans to establish points for e-waste collection, safe transportation and safe storage of the same. The authorized e-waste recycling company has expressed interest to transport the same to its plant at its own risk & cost.

### Transfer Stations

Six transfer stations are under planning in AMC with the objectives of savings in transportation cost, reduction in pollution and reducing contribution to traffic in the city. Transfer stations are being planned in five zones for handling 400 MT of MSW each. Eventually 12 stationary compactors, 60 containers (20 to 25 cu.m. capacity each) and 40 large hook loader vehicles would be required to transfer MSW from these stations to disposal site or treatment plants.

Figure 54 Equipment at Transfer Station - Stationary Compactor and Large Hook Loader Vehicle for Transfer Stations



Source: (AMC SWM Department, 2011)

## 6.5.12. Proposals of City Sanitation Plan for Solid Waste Management Services

### Recommendations for Segregation of MSW

- Dry and wet waste should be segregated at the earliest in Ahmedabad by residential, commercial and institutions.
- With implementation of advance levels of segregation in subsequent phases, dry waste should be further segregated into paper, plastics, metals, glass, fabric, etc.
- Food waste should be recycled for generation of compost material or for energy generation. Regulatory mechanisms should be introduced and enforced strictly.<sup>15</sup>
- E-Waste should be collected separately in compliance with E-Waste (Management & Handling) Rules, 2011, through any one of the modes:
  - o Deposition at retailers and wholesalers of electricals and electronics
  - o AMC's collection centre's to be planned at various locations in the city (1 per ward or 10 per zone – locations to be decided based on likely generation of e-waste)
  - o Formal licensed e-waste recyclers
- Batteries and cells should be segregated in compliance with Batteries (M&H) Rules, 2000
- AMC should register waste pickers and convert them to municipal waste collectors/ sorters/ sweepers through effective livelihood training. In order to rehabilitate, a detailed study on profile of waste pickers and potentials for rehabilitation should be conducted. The detailed study should also recommend an implementable action plan for the same.

Post registration of waste pickers, livelihood training programmes should be conducted to for increasing their employability as AMC's municipal SWM or sanitation workers, employment through SWM service providers and employment in recycling chain including collection, transportation and industrial processes. These recommendations are indicative in nature and should be clearly defined by the detailed study proposed.



### Recommendations for Door/Gate to Dump Collection in Residential, Slums and Commercial Areas

#### Door to Door Collection – Residential Areas and Slums

- i. To improve efficiency of Door/Gate to Dump system, door step collection of MSW from households needs to be strengthened. In order to do so, AMC should prepare a database of all residential societies/ associations and initiate a dialogue to ensure of regular service being provided to citizens.
- ii. For areas not served by any residential society/ association, AMC should mobilise community based organisations (CBOs) and NGOs to initiate door step collection. AMC can

<sup>15</sup> In the absence of a strict regulation, Singapore is failing to achieve its target of 70 % food waste recycling by 2030, while South Korea succeeded in achieving 94 % with strict enforcement **Invalid source specified.**

- restore the system where waste pickers were mainstreamed into the municipal stream as door step waste collection workers through NGOs/CBOs.
- iii. Similar system should be adopted for slums and chawls to ensure door step collection and avoiding mixing of domestic waste in community bins. AMC's award winning Slum Networking Programme (SNP) recognised service provision including SWM through NGO/CBO participation.
  - iv. AMC should order residential societies/ associations to store bins inside their premises and not encroach on public footpaths and roads. Strict enforcement should be done to penalise any offenders. AMC should introduce provision for storing MSW bins within premises in the building plan approval process.
  - v. AMC should also prepare standard operating procedures (SOP) and share them with residential societies/ associations and encourage them to follow the same. This would not only smoothen collection process but also build reliability of AMC's service. In addition to sharing, AMC should conduct comprehensive training and awareness for the same.
  - vi. As practiced currently, collection from residential areas should be done during morning hours.
  - vii. Any staffing or infrastructural deficiencies should be fulfilled as per requirements.

#### Door to Door Collection – Commercial Establishments

- i. To improve collection from commercial areas, AMC should increase awareness through regular dialogue with shop owners to store their waste in garbage bags within their premises during the day and place them outside their shops only at the end of the day. Dumping of waste on footpaths, road kerbs, drains, etc. should be strongly discouraged and even fined in case of non-compliance.
- ii. Collection of waste from commercial areas should be conducted during late evening hours, preferably after 2100 hrs when all shops are closing.

#### Door to Door Collection – Other Recommendations

- i. As per the new system of collection and transportation of waste, no transfer of waste from one vehicle to another should be done other than at designated zonal transfer station.
- ii. GPS installation and use for route planning and monitoring should be initiated on priority basis for efficient service and 100 percent coverage.
- iii. Design modifications should be undertaken in the fleet to incorporate the following changes
  - Compartmentalisation of fleet to collect segregated waste as per proposed segregation
  - Easy transfer of waste from bins into collection vehicle. Examples of low height loading vehicles used in other parts of the world have been provided in Annexure 16.
- iv. Strict enforcement of compliance by municipal/ contracted staff should be ensured as per the proposed standard operating procedures to be prepared by AMC including use of safety kit and protective gear for workers.
- v. Regular health checkups for all municipal/ contracted staff should be done in addition to provision of medical and insurance against occupational hazards

## Recommendations for MSW Collection through Street Sweeping & Litter Bins

### General Recommendations

- i. A comprehensive MIS including maps of areas swept by each sweeper, placing of litter bins, cleaning schedule, human resource management, etc. should be prepared. This MIS should be used for planning and managing daily activities and for monitoring the quality of work.
- ii. Standard operating procedures (SOP) should be prepared for carrying out street sweeping activities. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in street sweeping and collection of waste from litter bins.
- iii. Proper training and capacity building should be done of street sweeping staff to ensure compliance with the proposed Standard Operating Procedures (SOP).
- iv. Grading of cleanliness should be defined and areas should be monitored based on the grading system. Such systems are in practice in many parts of the world (refer Annexure 16).
- v. Any staffing or infrastructural deficiencies should be fulfilled as per requirements.
- vi. Regular health checkups for all municipal/ contracted staff should be done in addition to provision of medical and insurance against occupational hazards.

### MSW Collection from Street Sweeping

- i. Timings of street sweeping should be planned to improve efficiency of sweeping and cause minimum inconvenience to citizens. Night sweeping on arterial, sub-arterial and other major roads (without causing inconvenience to residents) should be initiated using mechanised road vacuum sweeping machines, while other neighbourhood level roads can be cleaned during the day.
- ii. Utmost care should be taken to ensure safety of workers and minimising occupational hazards by strict enforcement (including fines in case of violations) for use of proper gear (including reflective jackets) and appropriate equipments. Design improvements should be done to protective gear and equipments.
- iii. Manual handling of waste should be completely stopped by improving design of secondary bins and/or by creating ramps for emptying handcarts from a convenient height w.r.t. container opening.
- iv. Interdepartmental coordination should be done to ensure proper paving of unpaved areas/ areas prone to water collection, etc. to improve results achieved by street sweeping
- v. All measures should be taken to stop open defecation and until achieving so, mechanised equipment should be used for sweeping such areas. Under no circumstances, manual handling of human excreta should be allowed.
- vi. Strict human resource management should be enforced to prevent any unauthorised sub-contracting of street sweeping activities by workers.

### MSW Collection from Litter Bin

- i. A detailed plan should be prepared for litter bins in the city including
  - Design Considerations
  - Placement considerations
  - Management
    - Capital Framework (PPP or others)
    - Operational mechanism
    - Repair, maintenance and replacement (hardware)
- ii. Placement considerations should be done for the following areas
  - Commercial Areas

- Highly dense market with formal & informal activities – Teen Darwaza
  - Large corporate houses with large retail stores – S. G. Highway
  - Medium retail markets – C. G. Road
  - Mixed retail markets – Gurukul Road
  - Neighbourhood markets
  - Special markets (including meat, fish fruits, vegetables, flower, wholesale grain and agricultural markets)
  - Party plots
  - Banquets, shopping malls, complexes
  - Automobile workshops, service stations, petrol pumps
  - Residential Areas
    - Apartments
    - Bungalows
    - High density residential areas (old city & *gamtal* areas)
    - Slums and chawls
    - Farm houses/ low density housing areas
  - Institutional Areas
    - Religious institutions
    - Educational institutions
    - Government establishments
  - Transit Zones
    - Railway stations
    - Interstate bus stands
    - Local bus stands
    - Parks and gardens
    - Zoological gardens
- iii. A mechanism to report broken or missing litter bins should be introduced and a schedule for washing, repair and replacement of litter bins should be prepared.
- iv. As a part of SOP, all litter bins should be lined with garbage bags which should be removed daily while collecting waste. Other cities, in India have already adopted this practice with noticeably cleaner public areas, such as Bangalore.

Figure 55 Garbage bag placed in litter bin, Commercial Street, Bangalore.



Source: UMC

### Recommendation for H&K Hotels' & Restaurants' Kitchen MSW Collection

- i. A comprehensive MIS including maps with locations of units to be covered by collection vehicles should be prepared. Integration of the same with GPS-GPRS enabled tracking system should be used for monitoring and management of the fleet.
- ii. Regulatory mechanisms should be introduced by AMC to ensure that all hotels, restaurants, food joints, hawkers and vendors of fruits/ vegetables should be covered by H&K collection service. It should be mandatory for all such units to dispose H&K waste through this channel.
- iii. Renewal of licenses for hotels, restaurants, food joints, fruits/ vegetable vendors should be linked subject to compliance with H&K collection system. Similar mechanism should be adopted to ensure coverage of street hawkers and vendors by linking their policies with hawking licence renewals.
- iv. Specifications should be defined for vehicular fleet including capacities, size of the vehicle, loading/ emptying mechanism, etc. to ensure access to narrow streets and lanes. Customised fleet can be negotiated with vehicle suppliers for the same.
- v. Any staffing or infrastructural deficiencies should be fulfilled as per requirements.
- vi. Standard operating procedures (SOP) should be prepared for carrying out H&K waste collection. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in the processes with clear instructions for storing and transfer methods for H&K waste to collection staff<sup>16</sup>.
- vii. As per the SOP, use of appropriate protective gear/ equipment should be made mandatory for staff and penalties should be imposed in case on non-compliance.

### Recommendations for C&D MSW Collection

- i. Suitable reporting mechanism by street sweepers should be devised whereby street sweepers can report C&D waste dumped in an unauthorised manner. Appropriate action to clear the waste can then be initiated by the C&D waste collection team.
- ii. Mechanism for requests for collection should be strengthened at central and zonal level, and information flow should be properly channelized.
- iii. Suitable modifications can be implemented to building completion certificate issued by AMC. The modifications should include procuring a certificate indicating details of C&D disposal.
- iv. The fleet for collection of C&D waste should be equipped with vehicle mounted cranes for mechanised lifting of waste.
- v. Any staffing or infrastructural deficiencies should be fulfilled as per requirements.
- vi. Standard operating procedures (SOP) should be prepared for carrying out collection of C&D waste. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in the processes with clear instructions for loading, unloading, storing and transfer methods for C&D waste.
- vii. As per the SOP, use of appropriate protective gear/ equipment should be made mandatory for staff and penalties should be imposed in case on non-compliance.

<sup>16</sup> CPHEEO Manual for Solid Waste Management should be referred while preparing the same.

### **Recommendations for MSW Collection from Slaughter House, Meat, Fish and Special Markets**

- i. MSW collection through this stream should be extended to door step collection instead of secondary collection point only.
- ii. Non AMC meat and fish markets should also be covered. In addition to this, appropriate action should be taken to ensure disposal of waste from unauthorised slaughter houses and meat, chicken & fish shops through this stream.
- iii. All fruits, vegetables and grains markets should be covered by a dedicated (separate from meat and fish) with door step collection from each shop.
- iv. Fully mechanised fleet in adequate numbers with appropriate technology for loading, unloading and transportation of such waste should be adopted, eliminating the need for manual handling of such waste. Staff should be provided and instructed to use appropriate protective gear while handling such waste.
- v. Any staffing or infrastructural deficiencies should be fulfilled as per requirements.
- vi. Standard operating procedures (SOP) should be prepared for carrying out collection of such waste. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in the processes with clear instructions for loading, unloading, storing and transfer methods for meat/ fish waste.
- vii. A strict ban on disposing waste other than classified as meat/ fish waste should be enforced to avoid mixing of waste. Moreover, the problems in processing of such waste can thus be reduced by disallowing mixed waste from slaughter houses, meat, fish and special markets.
- viii. Strict action should be initiated against violators in case of burning of such waste and/ or packaging (including thermocol boxes).
- ix. As per the SOP, use of appropriate protective gear/ equipment should be made mandatory for staff and penalties should be imposed in case on non-compliance.

### **Recommendations for Lifting of Dead Animals**

- i. A reporting mechanism should be introduced whereby street sweeping staff should inform the dead animals collection team in case of any dead animal found in their respective stretch to be swept. Street sweeping staff should not be lifting dead animals and only trained dead animals collection team should undertake this task.
- ii. Dumping of dead animals in or around secondary collection bins should be completely stopped.
- iii. Adequate infrastructural upgradation (including vehicles and equipment) should be undertaken as per requirements.
- iv. Standard operating procedures (SOP) should be prepared for carrying out collection of such waste. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in the processes with clear instructions for loading, unloading, storing and transfer methods for meat/ fish waste.
- v. As per the SOP, use of appropriate protective gear/ equipment should be made mandatory for staff and penalties should be imposed in case on non-compliance.
- vi. Informal systems of dead animal collection should be regulated to ensure compliance with SOP.



### **Recommendations for Transportation of MSW**

In compliance with the proposed MSW collection and transportation strategy, MSW collected by Door/Gate to Dump system and from Secondary Collection Bins would be transported by primary collection vehicles to the proposed zonal transfer stations. No C&D waste should enter the transfer stations as it can damage the equipments for compaction or reduce efficiency of compaction process.

From these transfer stations, MSW would be compacted and transported to the processing plants or scientific landfill site using large hook loader vehicle. The system would suffice the requirements for the same until 2031 and hence, no additional infrastructural proposals have been made under this master plan.

However, preparation of Standard operating procedures (SOP) should be prepared for carrying out transportation of MSW. The SOP should provide minute details regarding the correct ways/ methods to carry out all tasks involved in the processes with clear instructions for loading, unloading, compacting and transfer methods for MSW. As per the SOP, use of appropriate protective gear/ equipment should be made mandatory for staff and penalties should be imposed in case on non-compliance.

### **Recommendations for MSW Processing In Ahmedabad**

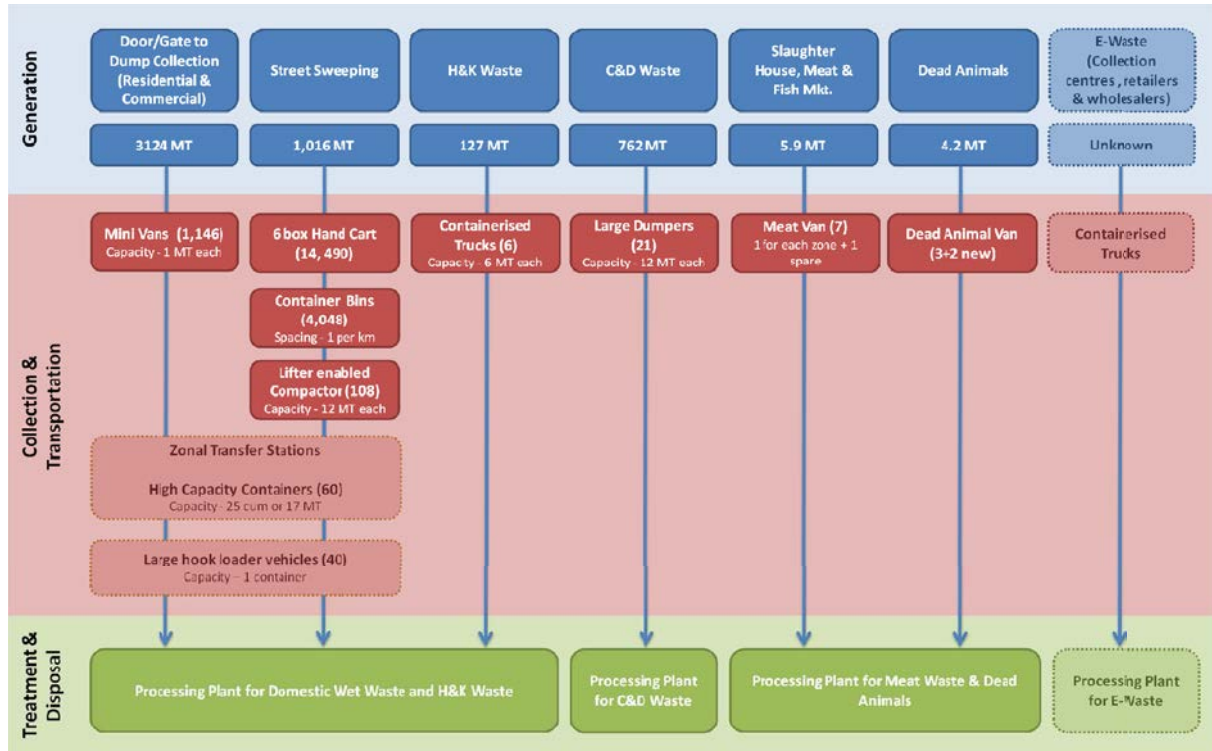
- i. Segregation of waste should be implemented in order to achieve efficient functioning of existing and proposed MSW processing plants.
- ii. Emphasis should be laid on plants for processing MSW which is already collected in segregated manner such as C&D waste, H&K waste, waste from dead animals and meat waste.
- iii. Immediate enforcement of ban should implemented against burning of waste anywhere in the city including Pirana.
- iv. Environmentally friendly practices of MSW processing should be setup to fulfil the processing gap of the future.

### **Recommendations for MSW Disposal In Ahmedabad**

- i. Efforts should be made on a priority basis to mainstream informal waste-pickers into formalised system of sorting/ segregating and in recycling industries.
- ii. Immediate enforcement of ban should implemented against burning of waste anywhere in the city including Pirana.
- iii. Adequate studies should be conducted to assess technological options for treating legacy waste and then choosing the most environment friendly method of eventual disposal of the same.
- iv. Immediate measures should be taken to correct the damage done by Pirana to its neighbouring areas.

Based on the analysis of municipal solid waste services and stage wise recommendations, the following mechanism should be strengthened to integrate ongoing initiatives listed in the previous section. The figure below explains the collection chain from source to treatment/ disposal while identifying various infrastructural requirements for the same.

Figure 56 Strengthening the Existing MSW Collection & Transportation Chain



Source: UMC

In order to strengthen the SWM system and fulfil existing and proposed gaps, the investment requirements have been presented below:

Table 92 Infrastructure Works Proposed for improving SWM Services until 2021

Component	Description	Quantity	Unit	Block Cost (INR in lakh)
Street MSW & Secondary Collection Bins	Purchase of hand carts for collection of waste from street sweeping (with 6 bins)	7,051	No.	282
	Purchase of safety kit & gear (including gloves, mask, body suit/uniform, boots, cap/helmet, etc.)	1,69,647	No.	Cost of consumables to be taken in O&M.
	Installation of litter bins at various commercial and public area of the city	4,397	No.	44
	Purchase of 1100/600 litres trolley bins	17,501	No.	175
	Purchase of trolley emptying mechanism enabled Refuse Compactors	11	No.	770
	Purchase of Truck Mounted Road Vacuum Sweepers	-	No.	-
	Purchase of Dumper Placers for 7 cu.m. container lifting	15	No.	450

<b>Residential &amp; Commercial MSW</b>	Purchase of vehicles for Door to Door Collection of waste from residences and commercial establishments	To be setup on PPP. No capital cost to AMC <sup>17</sup> .		
<b>Hotels' &amp; Restaurants' Kitchen MSW</b>	Purchase of van for collection of H&K Waste	To be setup on PPP. No capital or O&M costs to AMC.		
<b>Construction &amp; Demolition MSW</b>	Purchase of Tipper Trucks for collection of C&D Waste (12 MT)	-	No.	-
<b>MSW from Special Markets (Slaughter house, meat, fish, fruit &amp; vegetable)</b>	Purchase of van for collection of waste from slaughter house, meat & fish markets	-	No.	-
<b>Dead Animals Collection</b>	Purchase of van for collection of waste dead animals	1	No.	25
<b>Municipal E-Waste</b>	Setting up of E-Waste Collection Centres (10 in each zone) Purchase of vehicles for transportation of E-Waste (1 for each zone)	To be setup on PPP. No capital or O&M costs to AMC.		
<b>Transfer Station</b>	Purchase of Large Hook Loader vehicles, stationary compactors & 20 cum containers for Transfer Stations <sup>18</sup>	Partial procurement done. Order already placed for the rest.		
<b>Processing of MSW</b>	Development of composting plant	To be setup on PPP. No cost to AMC.		
	Development of waste to fuel plants	To be setup on PPP. No cost to AMC.		
	Development of E-Waste processing centre	To be setup on PPP. No cost to AMC.		
	Development of Meat waste and dead animals processing plant	To be setup on PPP. No cost to AMC.		
	Development of C&D waste processing plant	To be setup on PPP. No cost to AMC.		
<b>Disposal of MSW</b>	Development of engineered landfill site	Existing site sufficient till 2021.		
<b>Total</b>				<b>INR 1,746 lakh</b>

In addition to infrastructural improvements shown above, the city needs other initiatives to improve sewerage services in the city as listed below:

<sup>17</sup> O&M costs paid to private service providers for Door/ Gate to Dump. Payments done in the last 2 years have been tabulated in Table 85.

<sup>18</sup> AMC has planned purchase of 47 large hook loader vehicles, 12 stationary compactors and 62 containers of 20 cubic metre capacity for operation at transfer stations.

**Table 93 Studies and Programmes Proposed for improving SWM Services until 2021**

Component	Description	Quantity	Unit	Block Cost (INR in lakh)
<b>DPR Preparation</b>	Preparation of DPR for undertaking sanitation works proposed under this CSP	1	No.	50.0
<b>GIS Database preparation</b>	Preparation of GIS Database for Sanitation services under this CSP	1	No.	50.0
<b>IEC Campaign</b>	Sanitation and eliminating OD related IEC campaign	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Training &amp; Capacity Building</b>	TCB programme for Sanitation Department	Yearly activity for 9 years @ INR 70 lakh per year		630.0
<b>Total</b>				<b>INR 1,360 lakh</b>

Total investment requirement for solid waste management sector:

Component	Block Cost (INR in lakh)
Infrastructure Works	1,746
Studies & Programmes	1,360
<b>Total</b>	<b>INR 3,106 lakh</b>

## 7. Environment and Public Health

NUSP lays emphasis that improved public health and environmental standards are the two outcomes that cities must seek to ensure quality of life for urban citizens. It is in this context that health and environment assessment has been presented in the following section.

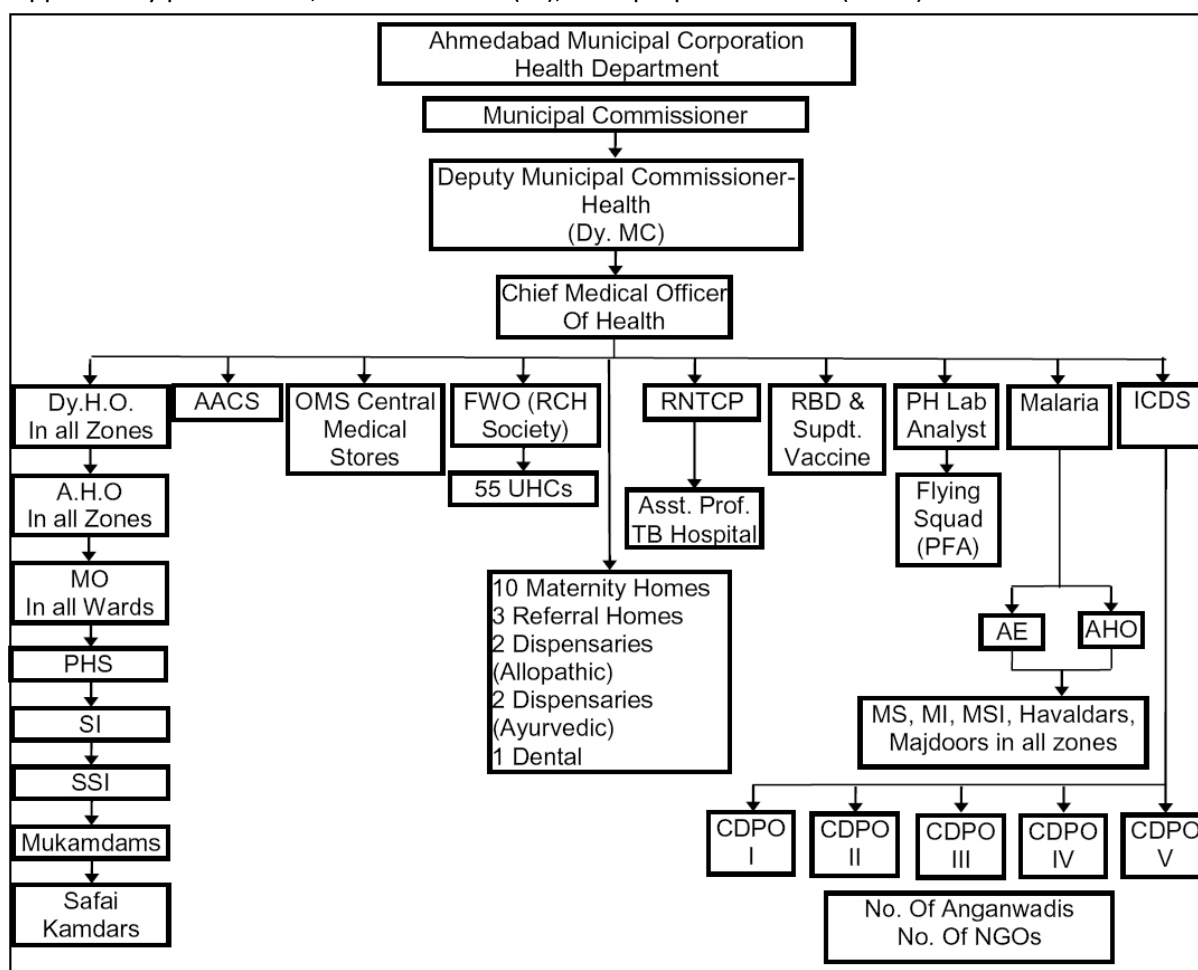
### 7.1. Public Health

AMC's Health Department is headed by a deputy municipal commissioner, who is supported by a chief medical officer of health. There are three deputy health officers in charge of Malaria & Epidemic, Health, and Birth & Death Registration departments.

Additionally, each of AMC's six zones is headed by a Deputy Health Officer. The Assistant Health Officer (AHO) at the zonal level acts as a link between the Medical Officer (MO) from each ward and the Deputy Health Officer at the zonal level.

The Medical Officer coordinates with the Sanitation Department's Assistant Health Officer to ensure proper sanitation management in wards and zones.

Local link workers (LW) report and register cases of cholera and diarrhoea with the Sanitation Department for proper preventive measures. Each health centre has at least one Medical Officer supported by pharmacists, lab-technicians (LT), multipurpose workers (MPW) and link workers.



The health of a city depends upon its infrastructure such as water supply and sanitation. To maintain the health standards, the Health Department needs to work and coordinate with other departments, mainly engineering and sanitation. The Engineering Department takes care of the city's water supply while the Sanitation Department's role is to ensure efficient solid waste management.

By improving the quality of water supply and by improving sanitation facilities, the Engineering and Sanitation departments, in coordination with the Health Department, can control outbreaks of water-borne diseases that are mainly caused by contamination of drinking water.

The number of water-borne diseases is an indicator of a city's quality of drinking water. The Sanitation Department is informed about cases of water-borne diseases in the city while the Engineering Department is intimated in the eventuality of insufficient chlorination of drinking water or any contamination in it. This helps both the departments to work out their action plan.

#### Health Epidemic:

Water borne diseases like Viral Hepatitis, Cholera, Typhoid, Gastroenteritis etc are the major diseases which are directly related to the quality of water consumed. The cases reported as illustrated in the table below shows that there are increasing trend in number of cases reported, but the cases of deaths reported are very less it shows that the AMC has good number of hospitals and dispensaries/clinics in city for curative measures, but there is need to put emphasis on preventive health measures.

**Table 94 Health Disease Cases Reported and number of Deaths**

Disease	2008		2009		2010	
	Cases Reported	Deaths Reported	Cases Reported	Deaths Reported	Cases Reported	Deaths Reported
Viral Hepatitis	2266	0	3427	1	3090	0
Cholera	14	0	70	0	165	0
Typhoid	593	0	600	0	778	0
Gastro Enter tics.	4449	1	6024	1	76730	0
<b>Total</b>	<b>7322</b>	<b>1</b>	<b>10121</b>	<b>2</b>	<b>80763</b>	<b>0</b>

Further, the trend has been analysed spatially through maps provided in Annexure 14.

The following table shows the results of water quality tested of five water bodies in AMC under the MoUD's National Sanitation Survey, 2009. Four of these water bodies failed quality tests for all parameter of CPHEEO.

Test results of water quality in different water bodies of Ahmedabad are shown in the table below:

Table 95 Quality Test Results' Summary of different Water Bodies

Water body*	Name of water body	No of samples tested				No of samples passed			
		3.1 Thermo-tolerant coliforms (TTC)	3.2 Dissolved Oxygen (DO)	3.3 BOD (Biological Oxygen Demand)	3.4 COD (Chemical Oxygen Demand)	3.5 Thermo-tolerant coliforms (TTC)	3.6 Dissolved Oxygen (DO)	3.7 BOD (Biological Oxygen Demand)	3.8 COD (Chemical Oxygen Demand)
Standing water body									
sample 1	Vastrapur Lake					Fail	Pass	Pass	Pass
sample 1	Kankaria Lake					Pass	Pass	Pass	Pass
sample 1	Sabarmati River					Pass	Pass	Pass	Pass

## 7.2. Environment

### Sabarmati River Front Development<sup>19</sup>

Sabarmati River which passes through the city has been over the years serving the city by carrying away storm water drains. Over the years, storm water drains has been abused with unofficial linkages with sewerage network (Tam, 2011). With around 35 storm water outfall points in the River Sabarmati, sewage has been discharged in the river untreated. River Sabarmati has been central to the city physically as well as culturally, and since 1961, various proposals have been discussed to revitalise the river and its adjoining areas.

Figure 57 Flooded River Sabarmati in 2006 (left); Pollution in River Sabarmati (right)



Source: Left - (The Tribune Online Edition, 2006); Right - (NYPost, 2009)

Bernard Kohn visited India in 1960s and proposed riverfront development for the first time. A technical feasibility of Kohn's proposal was conducted by CWPRS, Khadakvasla in 1966 for Government of Gujarat. Simultaneously, a contour survey was done by Sabarmati barrage Division. Both the studies were rendered invalid due to building of stop dams along the river and availability of more sophisticated analytical techniques.

The riverfront development was reconsidered in 1978 by River Front Development Group (RFDG) comprising of individuals, NGOs, prominent architects of the city, builders and engineers. This

<sup>19</sup> Source: (Environmental Planning Collaborative, 1998)

proposal included two main features i) construction of retaining walls, and ii) check discharge of sewage into River Sabarmati by strengthening Pirana STP. With changes in the city structure and development of further sophisticated implementation and financial mechanisms, this proposal was also no longer valid in 1990s.

National River Conservation Plan (NRCP) included River Sabarmati in 1992 intending Sabarmati River Cleaning Project (SRCP). The main objective of this scheme is to stop flow of sewage in the river by interception of sewage outfalls in the river along the length of the city. AMC is implementing this project currently.

CEPT University conducted feasibility for Sabarmati River Front Development (SRFD) in 1997 with a proposal for detailed urban design guidelines for development along the banks of the river.

In 1998, Environmental Planning Collaborative (EPC) outlined the final version of the riverfront proposal which is under implementation by AMC. This proposal intended to achieve the following:

- i) Recharge ground water aquifers
- ii) Strengthening transport network
- iii) Elimination of flood hazard
- iv) Relocation and Rehabilitation of slums
- v) Flood management
- vi) Provision of informal markets
- vii) Creation of recreational spaces
- viii) Beautification of the city

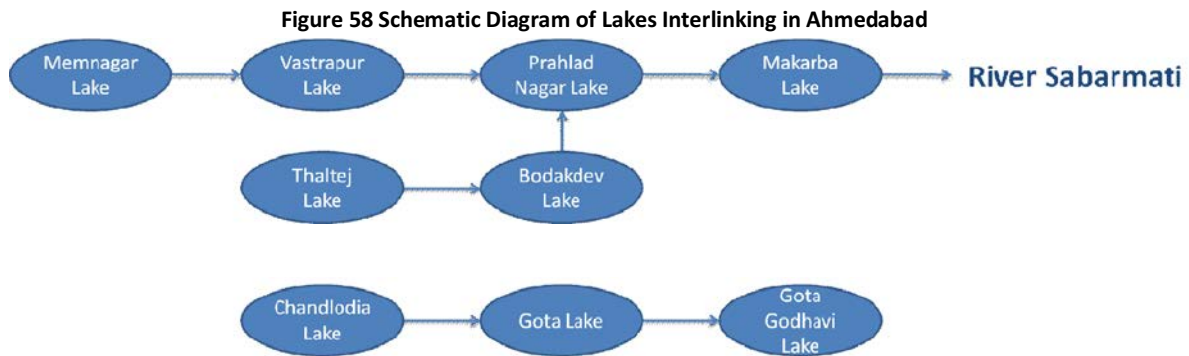
The above objectives are heavily dependent on the success of NRCP in controlling flow of sewage into the River Sabarmati.

### **Lakes Interlinking Project**

The Ahmedabad Urban Development Authority has been undertaking an ambitious “interlinking of lakes” project. Under this, it has been planned to develop storm water drainage to lakes from their catchment areas and also use the storage capacity of the lakes for diverted of storm water during heavy rains. The lakes needed to be interlinked through a network of underground drains eventually releasing overflows in River Sabarmati.

The authority is also channelizing drainage network around the water body to harvest the runoff into the lake depression. This project of interlinking of lakes through underground pipe line has been commissioned at a cost of INR105 crore and the lake development of 44 lakes at a cost of INR 100 crores. A map showing the project proposals has been provided in Annexure 8 while a schematic diagram showing interlinking of lakes is presented below.





Source: (AMC, Rejuvenation and Renovation of Urban Water Bodies of Ahmedabad, 2007)

### Tree Census & Green Cover

AMC has recently undertaken tree census to identify vital details of city's green lungs like species-wise number of trees, increase or decrease in number of trees, area-wise density/ proportion of trees, total bio-mass (a measurement of carbon storage in the city to know impacts of climate change) of the trees in the city etc.

The entire city with 64 wards was divided in 153 blocks, 70 dense green patches and Army Cantonment area for conducting the tree census. All the data collected is being mapped to overlay the areas deficient or well served with green cover. The results of the tree census conducted in Ahmedabad are awaited following which the civic authorities can take appropriate measures to improve.

As per an article published by Times of India, Ahmedabad needs 24 lakh trees to achieve 15 percent green cover. In the last 5 years, AMC has planted more than 11 lakh trees with survival rate of 67 percent (DNA, 2012).

This would not only be useful in mitigating climate change but also in improving quality of life by providing clean air (and environment) to the city. The link between green cover and sanitation may not be direct beyond clean air, but becomes clear as one studies the role played by trees in controlling silting of drains, both sewerage and storm water, and hence contributing to improved sanitation. In addition to controlling silting, trees support bio-diversity, facilitating natural cleansing mechanisms through certain species of birds, insects and mammals.

## 8. Institutional Assessment

### 8.1. City Governance

#### 8.1.1. Structure of Urban Governance

The Ahmedabad Municipal Corporation is governed by the Bombay Provincial Municipal Corporations Act, 1949 respectively and performs the obligatory and discretionary functions as incorporated in the said Act.

This chapter outlines the present structure of the elected and administrative wings of the municipal corporation and brings out the issues related to management functions, operations and reforms.

#### 8.1.2. Decentralized Administration: Zones & Wards

During the last three decades, the city has expanded in all directions. For administrative purposes, AMC area is divided into six zones. The zonal system envisages decentralization of activities and having a more responsive administration at the zone level. Each zone is headed by a Deputy Municipal Commissioner who has the responsibility of health and engineering for the respective zone. The Health Department at the zonal level is responsible for food inspection, Branch License Permit, Vaccination, Birth/Death registration, Family Planning. etc while the Engineering Department is responsible for building new roads up to 60 ft, widening roads, repairs and recarpetting works, constructing new buildings, maintaining municipal properties, sanctioning water connections, drainage connections, carrying out repairs of water pipelines, removing encroachments, etc.

The zonal administration is further decentralized into wards. There are altogether 64 ward offices headed by Ward Officers. There are three major responsibilities at the ward level – engineering, health and sanitation. Under the decentralized administrative setup, the powers and functions at each level are clearly delegated to the heads to discharge their functions adequately.

The ward offices are responsible for inspection of hotels, hawkers and small shopkeepers from hygienic point of view, cleaning of public urinals, collection, transportation and final disposal of MSW, availing basic details of the epidemic immediately to inform higher authority regarding disease controlling measures etc.

#### 8.1.3. Technology

AMC initiated computerisation of its works from 1997 onwards and later on implemented the entire e-governance module. The e-governance project commenced in January 2002, and the first civic centre was inaugurated on September 18 2002. Within a period of 8 months, e-governance was made available in the service of the people. The system has two different aspects -- (a) system for communication between the citizens and the municipal corporation, (b) system for Municipal Corporation's own use.

### 8.2. Staffing

Out of a total of 24559 employees in the AMC, around 73% of its staff are Class IV employees, 24% - Class III employees, 3% -Class II and 1% Class I.

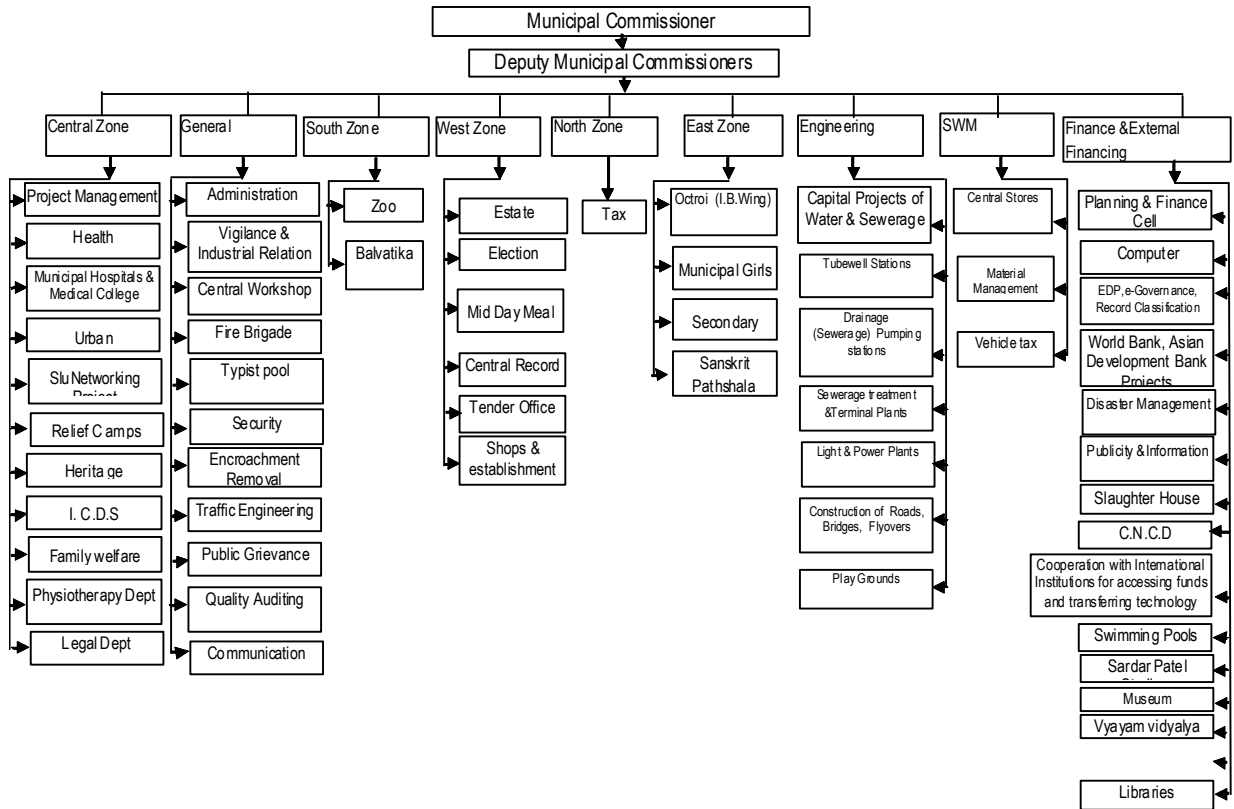
The organization is committed to drawing knowledge from experts and consultants. As of Jan 2011, AMC has a total of 90 professionals (CA's, MBA's and Accountants (ICWAI) spread in all its departments among the engineers, doctors, in the Class I and Class II categories.

Earlier, AMC used to recruit junior clerks from the open market through competitive test and these clerks use to go up in the ladder and take up higher positions up to deputy municipal commissioner. There was hardly any induction of direct recruits on administrative post. The promotions were automatic and not based on merit. Only in high positions merit was given some consideration. There was therefore no competitive element to show performance and the administration was also devoid of new ideas and professional work culture. Looking to the need of modernization in various departments, it was decided to induct professionals in the municipal administration as middle level managers and place them on strategic positions in various departments and groom them to higher positions later. It was also decided to introduce an element of direct recruitment from 33% to 50% in all technical as well as administrative cadres and induct new blood with higher qualifications and proficiency.

- Corporation's recruitment rules were revised to enable the corporation to make such direct recruitment
- In 1997, forty-one professionals were recruited as assistant managers. These were the people with the degrees of Master of Business Administration, Chartered Accountancy, & Institute of Cost & Works Accountants, etc.
- The new managers were inducted at a position - just above the class II level of officers
- These new officers are posted in various departments and are holding important positions in the area of octroi duty, property tax, finance, corporate planning etc
- They are being paid salaries equivalent/more than that paid to the fresh recruits in the corporate/private sector

AMC senior officials recommended that 2-3 professionals hired in a municipality for every 70,000 population would provide the required technical assistance and knowledge for forwarding the city's reform agenda. This is a key that the organization can benefit from ensuring appropriate and up-to-date knowledge utilized from hiring Chartered Accountants, Engineers, Health sector professionals, and MBA's.

Figure 59 Organogram of Ahmedabad Municipal Corporation



### 8.3. Status of Municipal Reforms

#### User Charges

A mandatory reform to be undertaken at the local body/city level is, “the levy of reasonable user charges by ULBs and parastatals with the objective that the full cost of Operation and Maintenance (O&M) or recurring cost is collected within the next seven years.” In other words, ULBs/parastatals managing the delivery of any urban service are required to revise user charges in such a manner that by the year 2012, income from user charges of a particular service recovers the full cost of O&M of the service. This is a very important mandatory reform and is critical for achieving self-sustainability of services and for improving the financial strength of ULBs. Its implementation does not require any additional financial expenditure, only political will. It also does not require any legislation amendments.

The Mission objectives for this reform are as follows:

- Establishment of linkages between asset creation and asset management through a series of reforms for long-term project sustainability.
- Ensuring adequate funds to meet the deficiencies in urban infrastructural services.

While the immediate priority for ULBs is to commit to progressive achievement of full cost recovery, this needs to be undertaken with care such that the present in-efficiencies in the services are not passed on to the customer.

ULBs shall also protect the interests of vulnerable groups through lifeline tariff mechanisms and cross subsidies and, simultaneously, commit to practical and achievable efficiency improvement plans as listed below:

- Increase in coverage (base) of users.
- Reduction in losses (commercial and technical losses);
- Improvement in method of measurement of service;
- Improvement in billing and collection efficiency.

Pay monthly bills for services, which are proportional to the costs of providing the same by the ULB.

**Desired Objectives:** JnNURM requires certain reforms to be undertaken by states/ cities in the levy of User Charges on different municipal services, with an objective of securing effective linkages between asset creation and asset maintenance and ultimately leading to self-sustaining delivery of urban services.

Table 96 Status of JnNURM Reforms Implementation by AMC

#	Reform Activities	Timeline	Status / Progress	Remarks
a	Formulation and adoption of a policy on user charges by State/ULB	2005-06	Done	GOG has passed enactment regarding levy of user charges.
b	Establishment of proper accounting system for each service so as to determine the O&M cost separately.			
	i. Water Supply and Sewerage		implemented	In exiting Accounting System AMC has a provision of Cost Centre for each service. From which O & M cost for each service is available in budget book.
	ii. Solid Waste Management		implemented	
	iii. Public Transport Services		implemented	
	iv. Others (PI Specify) Hiring of municipal assets like Swimming Pool		implemented	
c	Achievement of targeted service standards for the services	2006-07		following CPHEEO standards
	(i) Water Supply and Sewerage (LPCD received in household)			160 LPCD is supplied to the Citizen. Daily two hours water is supplied.
	(ii) Frequency of street sweeping			Thrice in a day.
	(iii) Public Transport Services			AMC has subsidiary AMTS for local transport and total nos. of fleet is 960. AMC has also established SPV named Janmarg Ltd for BRTS. At present 40 buses is running on 30 KM of BRTS corridor.
	(iv) Other (please specify)			
d	The State/ULB should define user charge structure and timelines for achieving these.	2006-07	Done	<ul style="list-style-type: none"> <li>Govt. of Gujarat has formed committee for recommending User Charge structure</li> <li>At present AMC has levied user charges as under : 30% of property tax is water tax for water supply 30% of property tax is conservancy tax for SWM &amp; sewerage</li> </ul>
e	The State should set up a body for recommending a user charge structure.	2005-06, 2006-07	Done	Govt. of Gujarat has formed committee for recommending User Charge structure
f	Plan for reduction in Non-Revenue Water (NRW) and Un-accounted for Water (UFW) Mechanism		Done	Implemented SCADA system for monitoring control of water quality and water pressure it is also useful for water auditing system to control Non Revenue water. SCADA system is implemented in 50 WDS out of 150 WDS. It is also implemented in 3 newly constructed STP under JnNURM.
g	Study to quantify and examine impact of subsidies for each service	2006-07	Done	

The AMC is exploring the possibility of introduction of metering system for water supply. A study will be completed in year 2 and then after it will be executed in phased manner. Moreover AMC is also introducing the concept of recycling of domestic liquid waste.

**Table 97 Comparison of Sanctioned vs. In-position staff for all departments of AMC.**

Function/ Department	CLASS I		CLASS II		CLASS III		CLASS IV		FIX PAY		TOTAL	
	S	P	S	P	S	P	S	P	S	P	S	P
Water Supply	2	1	5	3	73	65	68	53	0	4	148	126
Sanitation /Sewerage	9	8	42	35	729	695	10004	9924	305	299	11089	10961
Solid Waste Management	2	1	3	3	72	70	8	7	0	0	85	81
Property Tax/ Revenue dept	9	8	43	40	436	421	63	56	7	5	558	530
Town Planning/Building Plan Approval	10	5	75	74	248	234	256	232	0	0	589	545
Engineering / Public Works	35	32	253	242	975	943	2601	2521	60	53	3924	3791
Finance and Account	5	4	18	16	175	161	22	22	1	1	221	204
Poverty Alleviation/ Community Development	1	1	5	5	39	35	7	5	1	1	53	47
Health (hospital)	141	133	133	129	671	656	1013	969	157	143	2115	2030
MIS Computer cell	1	0	7	4	159	146	15	11	0	0	182	161
Education	0	0	6	2	53	48	21	16	2	2	82	68
General Administration	24	17	49	42	245	227	127	118	15	9	460	413
horticulture	1	1	1	0	37	28	110	103	0	0	149	132
Others	11	7	54	47	1493	1405	2404	2334	1738	1677	5700	5470
<b>Total</b>	<b>251</b>	<b>218</b>	<b>694</b>	<b>642</b>	<b>5405</b>	<b>5134</b>	<b>16719</b>	<b>16371</b>	<b>2286</b>	<b>2194</b>	<b>25355</b>	<b>24559</b>
S – Sanctioned, P – In Position												

## 8.4. Public Grievances Redressal Mechanism

AMC has 3 modes of registering complaints – telephone, internet, in-person. For registering complaints through the telephone, complainant can use one of the following:

- i. Toll free number (for entire city)
- ii. Zone Office Number (for respective zones)
- iii. Zonal Officers' Numbers (for respective zones)

For registering complaints using the internet, complainant can visit AMC's website at [www.egovamc.com](http://www.egovamc.com). AMC's website has a complaints section where one can lodge a complaint or provide suggestions. However, for municipal solid waste management, only 'Pale Depo (Dead Animal Removal)' link is available for registering complaints related to removal of dead animals as visible in figure below. There is no facility to report, lodge complaints or provide suggestions for public toilets, pay & use toilets or urinals.

Figure 60 AMC's Complaints & Suggestions Webpage

The screenshot shows the 'Complaint Registration' form on the AMC website. The form has the following fields:

- Category: A dropdown menu with a list of categories including 'PALE DEPO(DEAD ANIMAL REMOVAL)' which is currently selected.
- Zone: A text input field.
- Ward: A text input field.
- Applicant: A text input field.
- Address: A text input field.
- Email Id: A text input field.
- Phone: A text input field.
- Tenament No.: A text input field.
- Subject: A text input field.

At the bottom of the form are 'Submit' and 'Clear' buttons. The page header includes the AMC logo, navigation links (HOME, ABOUT US, CONTACT US, FEEDBACK, SITE MAP, FAQs), and the date '01 June 2012 Friday'.

Source: (AMC, Complaints & Suggestions, 2012)

Upon registering a complaint, a complaint number is generated for future reference. However, the complainant is not informed about redressal of his/her complaint at any point. Moreover, in case no action is taken for the complaint, there is no mechanism of escalation of the same to higher level officers.

Other issues related to Public Grievances Redressal (PGR) include

- i. Awareness amongst citizens about contact numbers for registering complaints
- ii. Transferring of responsibility by bureaucrats
- iii. Awareness amongst citizens about jurisdictions, especially zone and ward boundaries
- iv. Absence of integrated complaints database with AMC



With basic issues related to PGR like absence of integrated database makes redressal by concerned officials very difficult. Moreover, accountability of municipal staff towards a particular complaint is not clearly defined. The PGR system in AMC needs careful modifications to improve redressal system.

## 9. Municipal Finance Assessment

### 9.1. Overview of municipal finance reforms of AMC

In terms of financial health, the Ahmedabad Municipal Corporation (AMC) is considered to be one of the strongest urban local bodies in India. However, before 1993, AMC was a loss-making urban local body with accumulated cash losses of INR 350 million. (USD 9.2 million) and bank overdraft to the extent of INR 22 crore. During a deteriorating financial situation in 1994, AMC launched a major effort to strengthen its capacity to develop commercially viable projects. As a result, AMC was able to wipe off the cash losses in just five months, cleared all overdrafts, and became a surplus city by the end of 1994-95. In 1995-96 a surplus of 60 crores and in 1996-97 a surplus of 70 Crores was registered by the corporation which helped in leveraging large funds turn around its financial position and achieve a closing cash surplus of INR 2,142 million (USD 50 million) in March 1999.

Octroi continued to be the major source of revenues of the ULB till November 2008 when it was abolished by the Government of Gujarat. In this perspective, property tax has become an extremely important source of revenue for the AMC.

### 9.2. JnNURM Reforms Related to Finance

The JnNURM is a reforms linked incentive scheme to provide assistance to all ULBs. As per the mission, ULBs are to undertake mandatory and optional reforms. Out of these, the reforms pertaining to finance include:

- i. Property tax coverage of 85%
- ii. Property tax collection Efficiency of 90%
- iii. 100% cost recovery of water supply
- iv. 100% cost recovery in Solid Waste
- v. Internal earmarking of funds for the urban poor

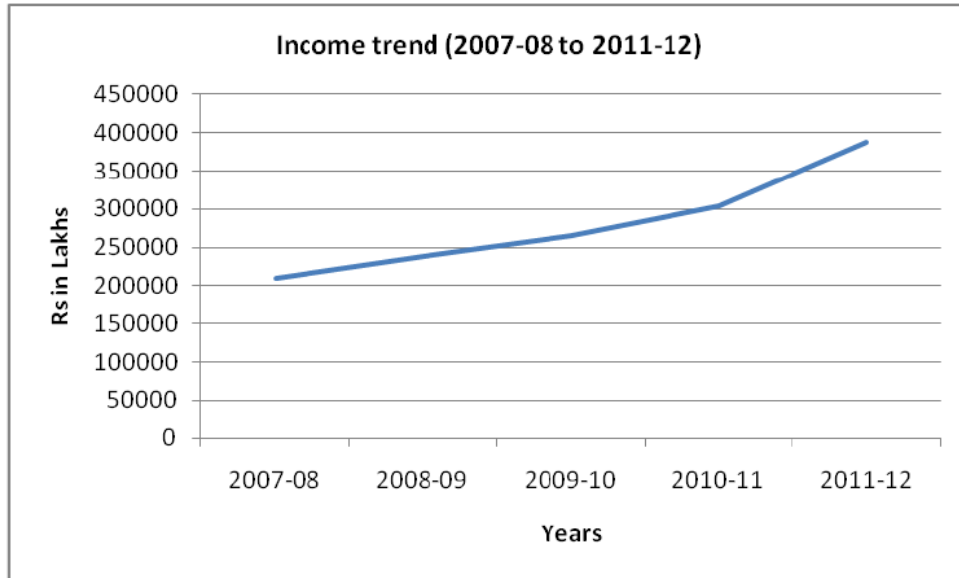
Ahmedabad Municipal Corporation has achieved the first two reforms.

### 9.3. Capital and Revenue Income of AMC

The total income (including revenue income and capital income) has grown from INR 2100.95 crores in 2007-08 to 3871.53 crores in 2011-12 at a compounded annual growth rate of 17%.

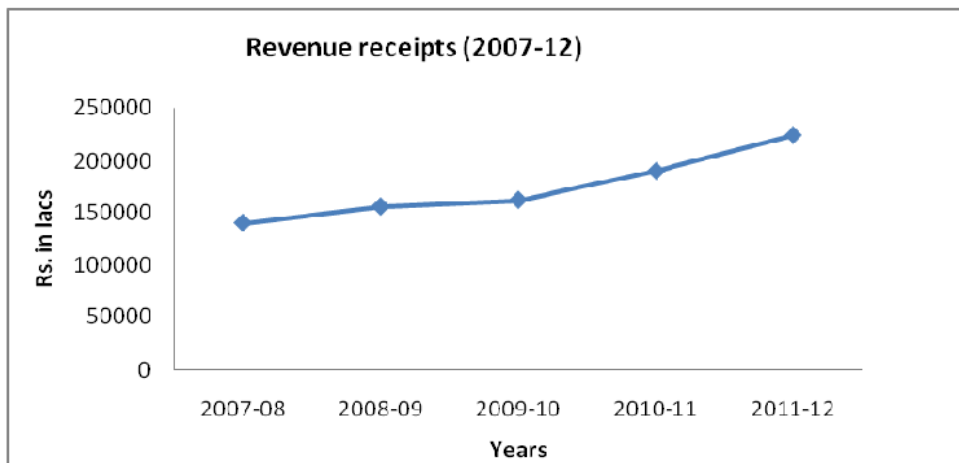
The income increased the highest at a rate of 27% in the year 2010-11 and 2011-12 while the growth rate dipped at 11% between the years 2008-09 and 2009-10. This could be attributed to a considerable dip in the revenue income at 4% growth rate in the same year.

The revenue income has been contributing 58-67% of the total income over these years. The proportion of revenue income has been declining steadily over the years from 67% in 2007-08 to 58% in 2011-12.

**Figure 61 Composite (Capital and Revenue) Income Trend of AMC since 2007-08**

Source: (AMC, 2012)

The annual revenue income of Ahmedabad Municipal Corporation has increased steadily and appreciably from INR 1400.9 Crores in 2007-08 to 2239.67 Crores in 2011-12. The compounded Annual Growth rate over this period has been 12%.

**Figure 62 Revenue Income of AMC since 2007-08**

Source: (AMC, 2012)

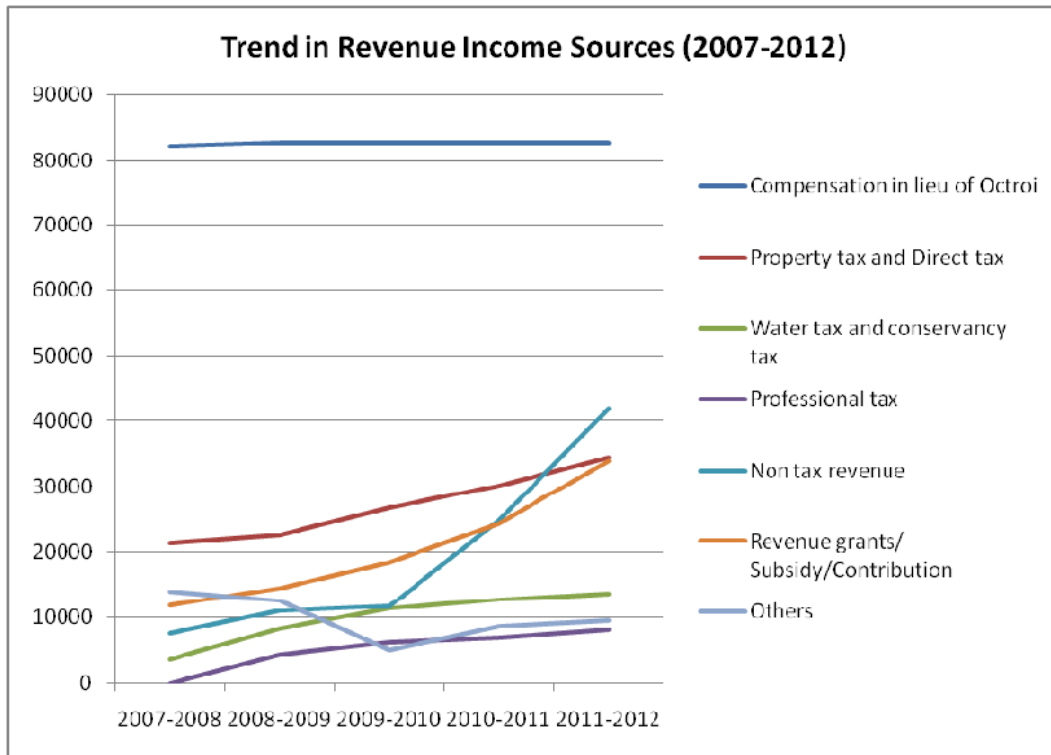
Revenue Income comprises of the following:

- Compensation in lieu of Octroi
- Property tax and Direct tax
- Water and conservancy tax
- Professional tax
- Non tax revenue
- Revenue grants/ Subsidy/Contribution

This growth in the receipts can be attributed to addition of professional tax income from the years 2008-09 and a steady growth in non-tax revenue. Professional tax has been contributing about 4% of the total revenue income of the AMC.

Non-tax revenue has grown from 74.59 Crores in 2007-08 to 419.32 Crores in 2011-12. Contribution of Revenue Grants/Subsidy has also grown from 8% in 2007-08 to 15% in 2011-12.

Figure 63 Trend in Revenue Income Sources since 2007-08



Source: (AMC, 2012)

**Own source receipts over the years**

**Property Tax source:**

Property tax has shown a steady increase over the years. As per data received from AMC, there are a total of 16,35,024 registered properties in the city. Out of this, 77% (1254479) properties are residential properties. Revenue from Property tax sources has been consistently contributing 15% of the total city’s revenue income since 2007-08.

The overall increase in absolute numbers has been from 213.72 crores in 2007-08 to 345 crores in 2011-12. Property tax registered a growth of 18% in 2009-10 from 2008-09.

**Box 3 Property Tax Reforms undertaken by AMC – Innovative and Pro-active Approach****Property tax reforms**

Property tax is an efficient, equitable means of financing municipal services in developing countries. Also, after the introduction of the new carpet area based system of property tax assessment, the total property tax collection has risen considerably.

AMC has been undertaking numerous property tax reforms since 1997, when it started a rigorous drive to recover property tax dues to the reforms in the tax assessment itself in 2001-02.

For the newly merged areas into AMC in 2006, most of the properties were already surveyed by the Gujarat Municipal Finance Board under the initiative to implement area based property tax assessment systems in all ULBs of Gujarat. For the municipalities, wherein the survey was not conducted, AMC conducted surveys.

It was decided to offer a gradual increase in property taxes to these newly merged areas. If tax calculated as per new formula was more than what the property owners were paying earlier, the owners were given an option of paying the difference over a three years time period. 25% of the difference could be paid in the first and second years respectively and remaining 50% of difference could be paid in the third year.

**Property Tax System before the initiative**

- The AMC's system of property tax assessment prior to 2001-02 was very complicated and in many ways irrational. Being based on notional rental value of properties, the assessed values were very low. These could not be revised due to the constraints of the Rent Control Act and related judicial decisions. Consequently, the AMC could only raise the tax rates which stood at 73% of the annual ratable value in the case of residential properties and 83% for non-residential properties. These high rates had a psychological impact on the property owners which lowered their willingness to pay the tax.
- Another undesirable outcome of the low assessment of property values was that 72% of the total number of residential properties in Ahmedabad and 31% of the commercial properties were exempted from paying the general property tax. There was also enormous disparity between assessment of self-occupied and tenant-occupied properties. The ratio of tax burden was 1: 15 in favour of the former.
- The end result of this irrational structure of the property tax system was that people perceived the system to be grossly unfair and non-transparent. It also led to corrupt practices in the tax department of AMC and the system was commonly described as "Inspector Raj".

**Innovations:**

- AMC initiated reforms in a phased manner to accommodate and minimize the legal and administrative challenges that are usually attached to reforms of this nature.
- In the first phase of reforms, a number of effective steps were taken to increase property tax collection with immediate effect. First, the municipal records of properties were updated and a large number of previously unrecorded properties were added. Next, all existing properties whose assessed value was grossly inadequate were reassessed. Finally, a number of punitive actions were taken against property tax defaulters. These included disconnection of water supply and drainage services; attachment of movable and immovable properties; and occasionally auction of properties for tax recovery.
- In the second phase of reforms, the AMC decided to evolve an "area-based property tax system" to replace the existing system based on annual rateable value. The ground work for the same began in 1999. It was an elaborate exercise involving large scale survey of properties throughout the city and

computerization of data. Nearly one million properties were surveyed. This survey was carried out by corporation appointed teams of a practicing valuer and a helper who measured the property.

- In order to maximize revenues from this source, AMC in early 2000 understood the deficiencies of the existing system of property taxation and replaced it with an alternative more rational system.
- As far as the policy matters were concerned, certain amendments had to be made to the Bombay Provincial Municipal Corporation Act (applicable to Gujarat) to accommodate the new system. Also, AMC became the first Municipal Corporation in India to adopt the amendment.<sup>1</sup>
- This again was a very comprehensive exercise consisting of special task group meetings, brain storming, publication of special notices and bills to the property owners, conducting hearings to receive objections, and piloting the proposed changes through the standing committee and finally seeking an approval of the state government.
- The entire process was completed in about two years and the new system was introduced in the second half of 2001-02.
- AMC has amended the Act instead of making a permanent change to it, which gives it an option of switching to the old rent based method as well. Thus, property tax can either be collected under Section 129 for Ratable Value based system or under Section 141B for Carpet Area based system.
- Under the new formula, the property tax is computed by applying a per unit tax rate to the total carpet area of the property and adjusting for location, age, type of use and whether the property is owner or tenant occupied.

#### Properties Exempted from Property Tax

No.	Type of Exemption	Qualifying institution/individual	Revenue implication of exemption
1.	Property Tax exempted by way of assigning Zero value to use of property	Non - Residential – Religious Places i.e. sanctorum of such places of worship	INR 80.60 lakh per year

In the present property tax system exemption is not given to any type property except religious places where property tax is exempted only for the area of sanctorum. Such properties have to pay water and sewerage charge. Thus no property is issued a bill of zero demand. Also, for closed and unused buildings, 75% of the property tax is exempted.

#### Water Tax and Connection Charges

Water and conservancy taxes are billed as part of the property tax bills since the year 2008-09. A consolidated bill is generated and sent to each property holder. 30 % of the property tax is water tax while another 30% is for conservancy tax (15% for sewerage and 15% for solid waste management). The tax percentages are the same across all categories of properties- residential, commercial, institutional and industrial properties.

The following table highlights the connection charges:

**Table 98 Various connection charges for Water Supply and Sewerage in Ahmedabad**

Heads	Initial connection charge (in INR per connection)		
	General	Special ( <i>Poor/ small properties</i> )	Remarks
Water supply-Residential	100	100	1/2"
	300	300	3/4"
	1200	1200	1"
Water supply-Commercial	300	0	1/2"
	1000	0	3/4"
	2000	0	1"
Sewerage	400	600	6" to 9"

Source: (AMC, 2012)

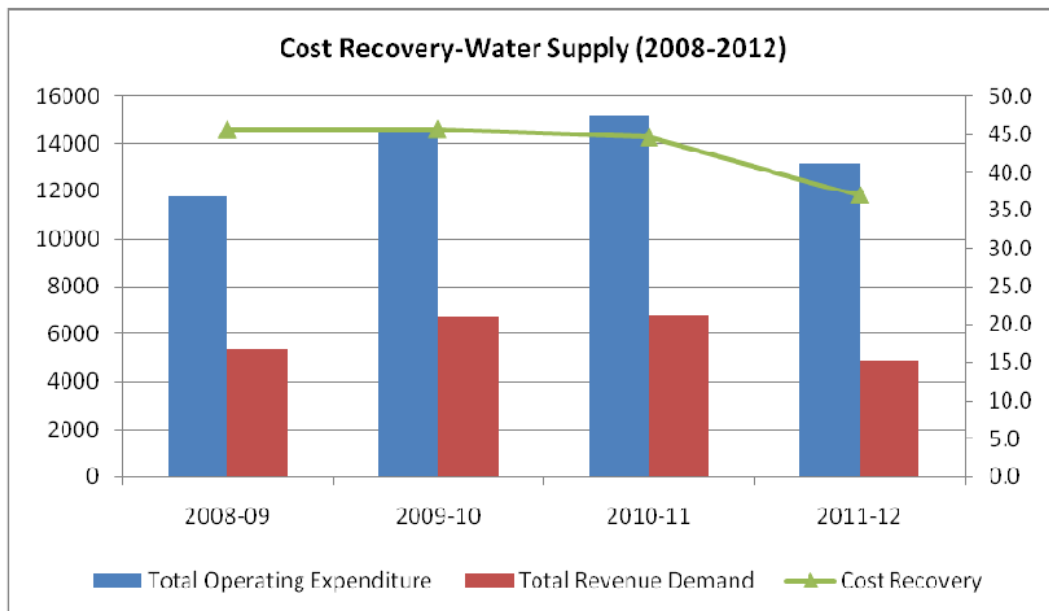
The following table highlights the cost recovery figures for all the three sectors of water supply, sewerage and solid waste management:

**Table 99 Cost Recovery of Water Supply, Sewerage and Solid Waste Management in AMC**

Cost Recovery	2008-09	2009-10	2010-11
Water Supply	46	46	45
Waste Water	84	55	66
SWM Services	26	24	20

Source: Source: (AMC, 2012); Computation by UMC

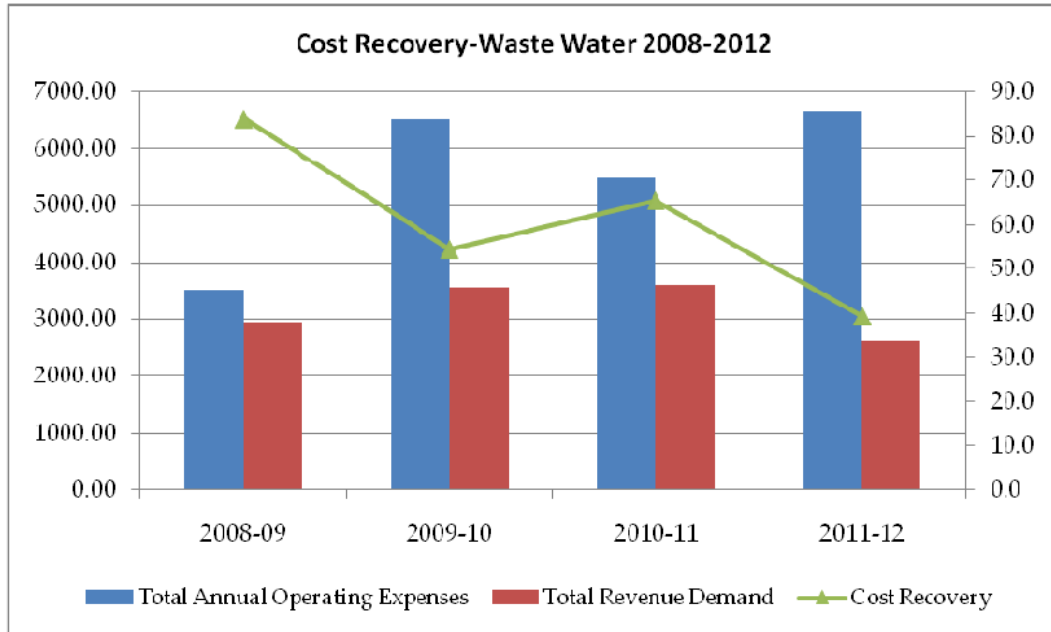
**Figure 64 Cost Recovery of AMC in Water Supply since 2008-09**



Note: For 2011-12, only revised financial estimates have been used and hence may indicate variation from actual.

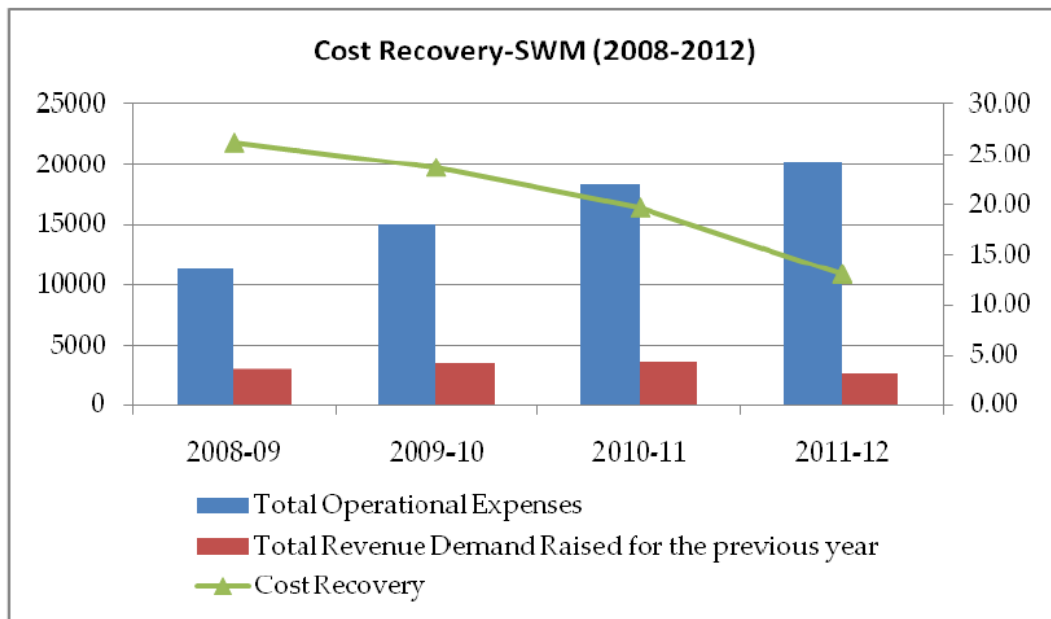
Source: (AMC, 2012)

Figure 65 Cost Recovery of AMC in Sewerage since 2008-09



Source: (AMC, 2012)

Figure 66 Cost Recovery of AMC in Solid Waste Management since 2008-09



Source: (AMC, 2012)

Cost recovery is calculated as a percentage of the total revenue demand for the year divided by the total operating expenditure. Cost recovery in the water sector has remained static at around 45-46%. The revenue demand for water has grown from 53.74 crores in 2008-09 to 67.57 Crores in 2010-11; while expenditure grew from 117.7 Crores in 2008-09 year to 151.27 Crore in 2010-11.

Cost recovery in the solid waste management sector is usually an issue across all ULBs in the country. SWM is an expenditure heavy sector. The total operational expenditure has increased by 78% in 2011-12 from 2008-09. The major expenditure is in the components of staffing and administration costs.

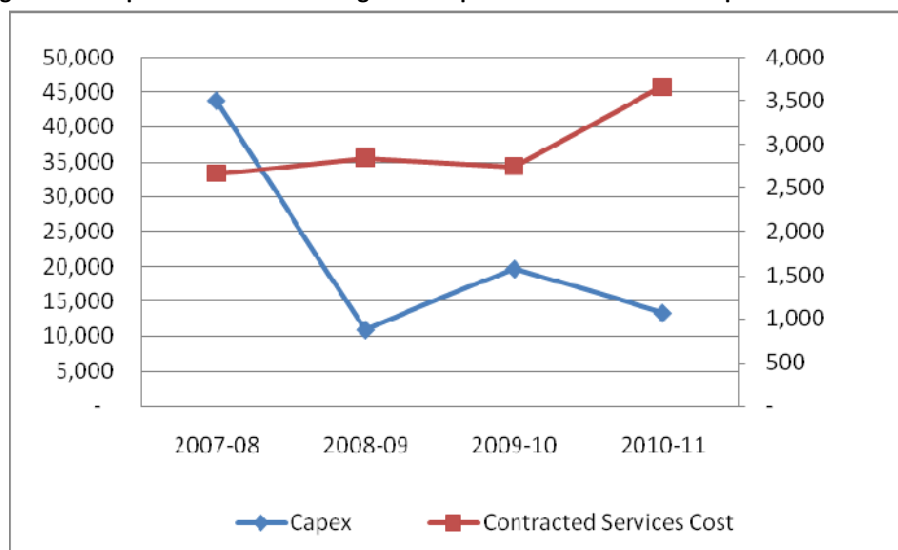


### Changing Scenario with Private Sector Participation in SWM

Further, there has been increase in the engagement of private sector in SWM services. In some components such as Door/Gate to Dump system, the PPP structure involves capital investments to be made by private agencies. The capital investments are in turn recovered through payments made by AMC to the private agency for O&M of the service.

The figure below explains the above phenomenon indicating a sharp rise in the revenue expenditure with implementation of PPP in Door/Gate to Dump system in 2009-10.

**Figure 67 Comparative chart indicating fall in Capex and rise in Revenue Expenditure due to PPP**



*Note: 2011-12 data has not been included as audited finance data is not available*

Source: (AMC, 2012)

Hence, in reality, the capital investment which would have been undertaken by AMC if PPP was not executed, has been transferred into revenue expenditure through payment made to private in the current model. This has further affected the cost recovery in SWM services. To quantify this phenomenon, roughly 680 vehicles have been bought of various types including 610 mini vans (Tata Ace type) and 70 compactors approximately costing INR 5 lakh and INR 70 lakh each, respectively. Hence, the total capital investment made is around INR 7950 lakh, or say INR 80 crores. This capital investment made by private agencies is being recovered along with the O&M charges over a period of time, say 5 years, translating into INR 16 crore per year without any interest or opportunity costs.

### Receipts from Government of Gujarat

#### Capital Income

Capital Income of AMC comprises of:

- Government Grants
- Beneficiary Contribution
- Fire Tax Income
- Loans-SRFDCL

For purposes of analysis here, the component of government grants has been considered for further break up.

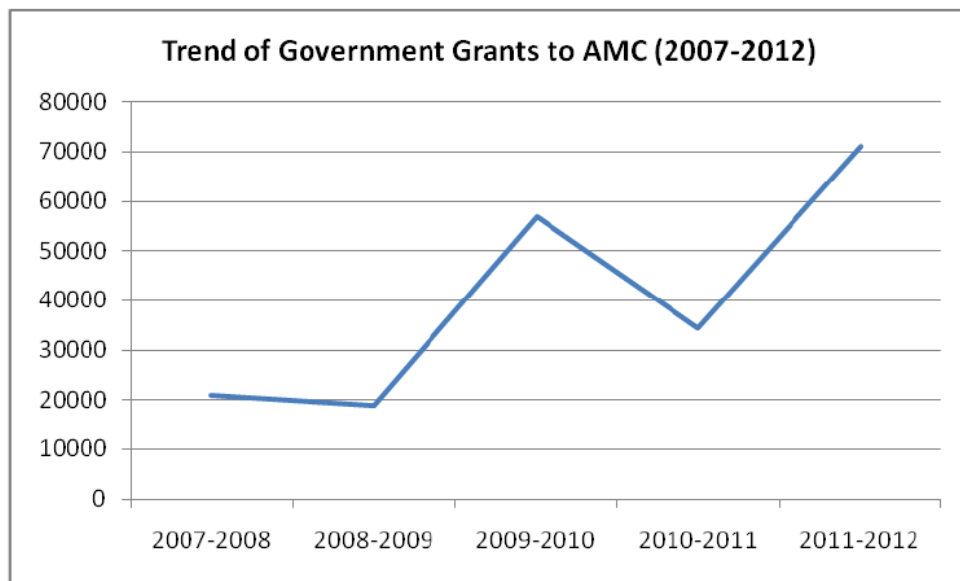
Government grants increased from 700 Crores in 2007-08 to 1631.8 crores in 2011-12. Government grants comprise of the following grants:

- Grants under the JnNURM
- Swarnim Jayanti Mukhya Mantri Shehri Vikas Yojana (SJMMSVY)
- Dhara Sabhya
- MP Grant
- Grants from Gujarat Municipal Finance Board towards entertainment tax and for construction of pay and use toilets
- Grant from Govt. of India for Sabarmati River Water cleaning/purification

AMC has started receiving JnNURM funding since 2005-06. Looking at the trend of proportion of JnNURM grants to the capital income over the last five years, the trend is erratic. JnNURM funds comprised almost 81% of the total capital income in 2007-08, which reduced to 77.57 in 2009-10 and 59.3% in 2010-2011 and to 34.03% in 2011-12.

Funding from the state government's SJMMY has been increasing in the past two years.

**Figure 68 Trend of Capital Grants received by AMC since 2007-08**

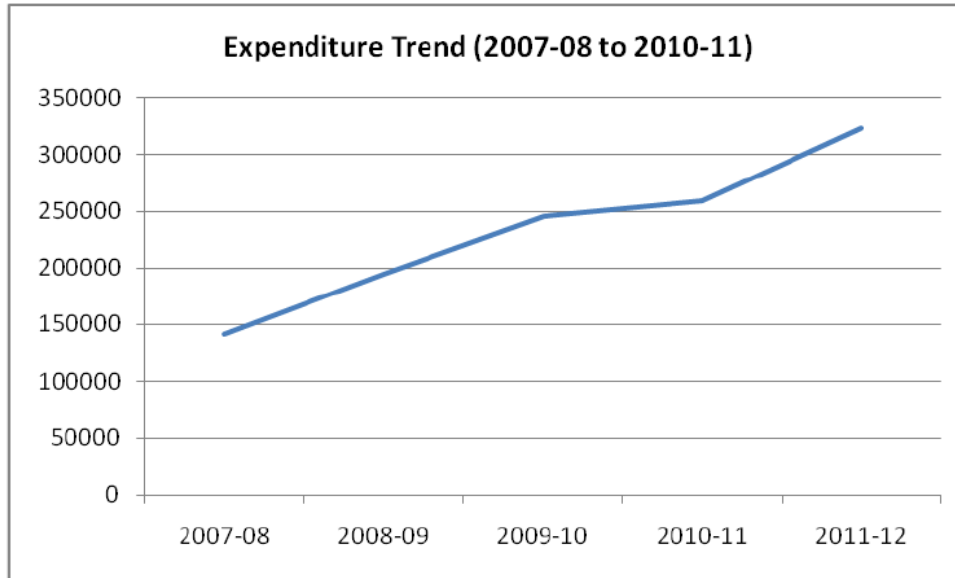


Source: (AMC, 2012)

#### **9.4. Capital and Revenue Expenditure of AMC**

The total expenditure of AMC was 1409.66 Crores in 2007-08 which has increased to 3238.13 Crores in 2011-12. The expenditure increased at a rate of 38% in 2008-09 over 2007-08 and at a rate of 26% in 2009-2010 over 2008-09. Then the rate decreased to 6% in 2010-11 over 2009-10 and again increased to 25% in the subsequent year.

Figure 69 Composite (Capital and Revenue) Expenditure done by AMC since 2007-08



Source: (AMC, 2012)

The high increase in total expenditure in 2007-08 and 2008-09 years can be attributed to a considerable growth of 109% in Capex during the same years. The total Capex increased from 493.85 crores in 2007-08 to 1031.2 crores in 2008-09.

The total capex in the last financial year 2011-12 stood at 1631.8 crores. Comparing the Capex with the revenue expenditure over the same period years, it seems that AMC has controlled its revenue expenditure. The growth in revenue expenditure declined by 1% in 2008-09 from 2007-08 year and then increased at 27% in the subsequent year and then decreased at 14%.

The following table shows the total annual surplus/deficit figures for AMC. The table reveals that the AMC has been showing a surplus consistently over the past 5 years. The highest surplus was in the year 2007-08 at 691.2 crores and the lowest surplus was in the year 2009-10 at 202.45 lakh. However, there is a wide fluctuation in the surplus of AMC.

Table 100 Surplus/ Deficit of AMC since 2007-08

All INR In Crores	2007-08	2008-09	2009-10	2010-11	2011-12
Total Income	2100.96	2390.46	2653.49	3043.52	3871.53
Total Expenditure	1409.67	1941.63	2451.04	2592.7	3238.13
Surplus	691.28	448.83	202.45	450.82	633.40

Source: (AMC, 2012); Computation by UMC.

## 10. Investment Plan and Implementation Framework

### 10.1. Capital Investment Requirements

This section indicates the investment requirements for the projects and programmes identified in this CSP. The investment plan has been structured to ensure sourcing of capital funds for execution of projects in an appropriate manner. It is imperative that this investment plan be revisited every year in order to make correctional adjustments induced by varying financial market dynamics, new technologies, introduction of central/state schemes and growth trend of the city; and hence overall need of the city in each year.

This investment plan considers the investment requirements based on the phasing of the CSP in the following phases

- Phase 1 – up to 2016
- Phase 2 – 2017 to 2021

The next section computes the sectoral requirements for investment in the above listed phases for development.

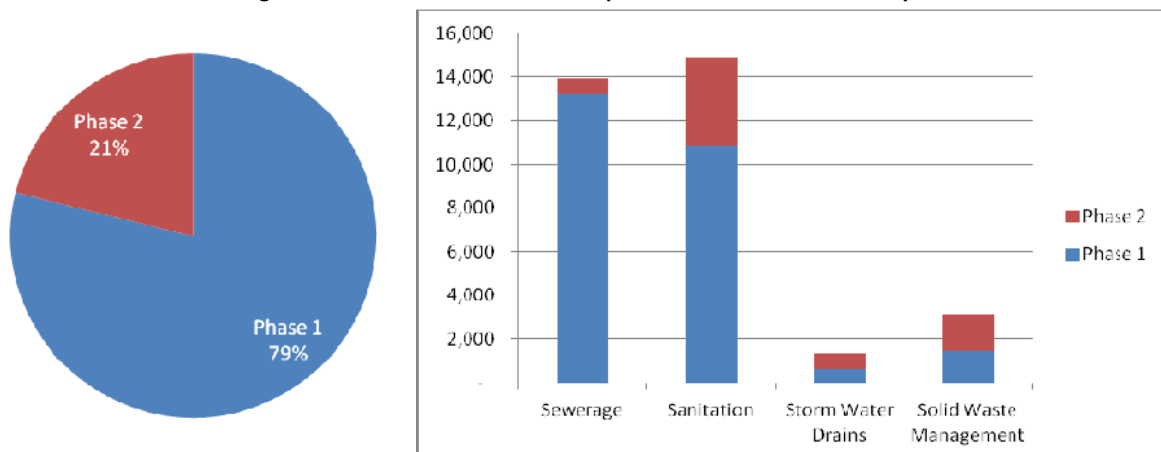
**Table 101 Phase wise sectoral investment requirements for CSP**

Sector	Phase 1	Phase 2	Total
Sewerage	13,176	700	<b>13,876</b>
Sanitation	10,860	4,008	<b>14,868</b>
Storm Water Drains	660	700	<b>1,360</b>
Solid Waste Management	1,479	1,627	<b>3,106</b>
<b>Total Investment Proposed under this CSP</b>	<b>26,175</b>	<b>7,035</b>	<b>33,210</b>

*All figures in INR in lakh.*

The above investment has been represented sector wise in the graph below:

**Figure 70 Sector wise investment requirement under CSP for each phase**



Overall, around 79 percent of the total investment is needed in Phase 1, i.e. upto 2016, while the remaining 21 percent in Phase 2. Infrastructure investment requirements in storm water drainage have not been calculated as AMC's approach to designing SWD system is based on data collected for

local flooding spots. Since data collection for new expansions is currently on, drain requirements for the same could not be computed.

As discussed in sector analysis, infrastructural improvements have been supported by other initiatives such as studies, database preparation, surveys, IEC campaigns, training and capacity building programmes. Investment requirement under the CSP for infrastructure and other studies/ programmes has been presented below:

**Figure 71 Sector wise Investment requirements for Infrastructural Improvements as well as Studies/ Programmes**

Sector	Infrastructure Improvements	Studies & Programmes	Total
Sewerage	12,516	1,360	<b>13,876</b>
Sanitation	13,508	1,360	<b>14,868</b>
Storm Water Drains	-	1,360	<b>1,360</b>
Solid Waste Management	1,746	1,360	<b>3,106</b>
<b>Total Investment Proposed under this CSP</b>	<b>27,770</b>	<b>5,440</b>	<b>33,210</b>
<i>All figures in INR in lakh.</i>			

Of the total of INR 332 crores, around 84 percent of total investment is needed in infrastructural improvements while the remaining 16 percent is need for studies and programmes of all sectors. No infrastructure costs for SWD have been computed for the reasons explained earlier.

## 10.2. Sources of Funding and Implementation Framework

In order to clearly define the roles and responsibilities of various stakeholders including AMC, state government, central government, private agencies, NGOs, etc., all projects proposed under this CSP have been broken down into four components – funding, implementation/ execution (for infrastructure), operation & maintenance and monitoring the performance.

Some of the methods of funding the projects proposed under this CSP may include:

- AMC's own sources
- JnNURM
- Swarnim Jayanti Mukhya Mantri Shehri Vikas Yojana (and its sub components)
- Grants from Gujarat Municipal Finance Board towards entertainment tax and for construction of pay and use toilets
- Grant from Govt. of India for Sabarmati River Water cleaning/purification
- MP Grants
- Public Private Partnership

The table below provides implementation framework of all the projects proposed for Sewerage.

**Table 102 Implementation Framework for Proposed Projects in Sewerage**

Project Component	Funding	Implementation/ Execution	Operation & Maintenance	Monitoring
<b>Infrastructure Improvements</b>				
<b>Refurbishment of existing sewerage network</b>	JnNURM/ SJMMSVY/ AMC	AMC	AMC	AMC
<b>Provision of sewerage connections</b>	Consumer	AMC	AMC	AMC
<b>Provision of sewerage connections in slums</b>	Consumer/ Special Schemes such as 500 NOC, SNP, etc.	AMC	AMC	AMC
<b>Studies &amp; Programmes</b>				
<b>DPR Preparation</b>	JnNURM/ AMC	Competent consultancy	-	AMC
<b>GIS Database preparation</b>	JnNURM/ AMC	Competent consultancy	AMC	AMC
<b>IEC Campaign</b>	JnNURM/ AMC	Competent consultancy	-	AMC
<b>Training &amp; Capacity Building</b>	JnNURM/ SJMMSVY/ AMC	Competent consultancy	-	AMC

**Table 103 Implementation Framework for Proposed Projects in Sanitation**

Project Component	Funding	Implementation/ Execution	Operation & Maintenance	Monitoring
<b>Infrastructure Improvements</b>				
Construction of individual toilets	JnNURM/ SJMMSVY <sup>20</sup> & Beneficiary	AMC	User	User
Refurbishment of existing public/ pay & use toilet seats	JnNURM/ SJMMSVY/ AMC/ PPP/ NGOs	AMC/ PPP	AMC/ PPP/ NGOs	AMC
Construction of new toilet seats	JnNURM/ SJMMSVY/ AMC/ PPP/ NGOs	AMC/ PPP	AMC/ PPP/ NGOs	AMC
Refurbishment of existing men's urinals	JnNURM/ SJMMSVY/ AMC/ PPP/ NGOs	AMC/ PPP	AMC/ PPP/ NGOs	AMC
New Urinals (for women)	JnNURM/ SJMMSVY/ AMC/ PPP/ NGOs	AMC/ PPP	AMC/ PPP/ NGOs	AMC

<sup>20</sup> SJMMSVY – Swarnim Jayanti Mukhya Mantri Shehri Vikas Yojana

Construction of bathing units	JnNURM/ SJMMSVY/ AMC/ PPP/ NGOs	AMC/ PPP	AMC/ PPP/ NGOs	AMC
<b>Studies &amp; Programmes</b>				
DPR Preparation	JnNURM/ AMC	Competent consultancy	-	AMC
GIS Database preparation	JnNURM/ AMC	Competent consultancy	AMC	AMC
IEC Campaign	JnNURM/ AMC	Competent consultancy	-	AMC
Training & Capacity Building	JnNURM/ SJMMSVY/ AMC	Competent consultancy	-	AMC

Table 104 Implementation Framework for Proposed Projects in Storm Water Drainage

Project Component	Funding	Implementation/ Execution	Operation & Maintenance	Monitoring
<b>Infrastructure Improvements</b>				
<b>Construction of new SWD in future developments</b>	JnNURM/ SJMMSVY/ AMC	AMC	AMC	AMC
<b>Studies &amp; Programmes</b>				
DPR Preparation	JnNURM/ AMC	Competent consultancy	-	AMC
GIS Database preparation	JnNURM/ AMC	Competent consultancy	AMC	AMC
IEC Campaign	JnNURM/ AMC	Competent consultancy	-	AMC
Training & Capacity Building	JnNURM/ SJMMSVY/ AMC	Competent consultancy	-	AMC

Table 105 Implementation Framework for Proposed Projects in Solid Waste Management

Project Component	Funding	Implementation/ Execution	Operation & Maintenance	Monitoring
<b>Infrastructure Improvements</b>				
<b>Purchase of hand carts for collection of waste from street sweeping (with 6 bins)</b>	JnNURM/ SJMMSVY/ AMC	-	AMC	AMC
<b>Purchase of safety kit &amp; gear (including gloves, mask, body suit/uniform, boots, cap/helmet, etc.)</b>	AMC (Consumables to be considered under O&M)	-	AMC/ All Private Agencies on PPP	AMC
<b>Installation of litter bins at various commercial and public area of the city</b>	JnNURM/ SJMMSVY/ AMC	AMC	AMC	AMC
<b>Purchase of 1100/600 litre trolley bins</b>	JnNURM/ SJMMSVY/ AMC/ large	-	AMC	AMC

	scale consumers (malls, hotels, etc.)				
<b>Purchase of trolley emptying mechanism enabled Refuse Compactors</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Purchase of Truck Mounted Road Vacuum Sweepers</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Purchase of Dumper Placers for 7 cu.m. container lifting</b>	JnNURM/ SJMMSVY/ AMC/ PPP	-		AMC/ Private Agency	AMC
<b>Purchase of vehicles for Door to Door Collection of waste from residences and commercial establishments</b>	PPP	-		Private Agency	AMC
<b>Purchase of van for collection of H&amp;K Waste</b>	PPP	-		Private Agency	AMC
<b>Purchase of Tipper Trucks for collection of C&amp;D Waste (12 MT)</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Purchase of van for collection of waste from slaughter house, meat &amp; fish markets</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Purchase of van for collection of waste dead animals</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Setting up of E-Waste Collection Centres (10 in each zone)</b>	PPP	Private Agency		Private Agency	AMC/ GPCB
<b>Purchase of vehicles for transportation of E-Waste (1 for each zone)</b>	PPP	-		Private Agency	AMC
<b>Purchase of Large Hook Loader vehicles, stationary compactors &amp; 20 cum containers for Transfer Stations</b>	JnNURM/ SJMMSVY/ AMC	-		AMC	AMC
<b>Development of composting plant</b>	PPP	Private Agency		Private Agency	AMC/ GPCB
<b>Development of waste to fuel plants</b>	PPP	Private Agency		Private Agency	AMC/ GPCB
<b>Development of E-Waste processing centre</b>	PPP	Private Agency		Private Agency	AMC/ GPCB
<b>Development of Meat waste and dead animals processing plant</b>	PPP	Private Agency		Private Agency	AMC/ GPCB
<b>Development of C&amp;D waste</b>	PPP	Private Agency		Private Agency	AMC/ GPCB



<b>processing plant</b>				
<b>Development of engineered landfill site</b>	JnNURM/ SJMMMSVY/ AMC	AMC	AMC	AMC/ GPCB
<b>Studies &amp; Programmes</b>				
DPR Preparation	JnNURM/ AMC	Competent consultancy	-	AMC
GIS Database preparation	JnNURM/ AMC	Competent consultancy	AMC	AMC
IEC Campaign	JnNURM/ AMC	Competent consultancy	-	AMC
Training & Capacity Building	JnNURM/ SJMMMSVY/ AMC	Competent consultancy	-	AMC

### 10.3. Operation & Maintenance

As evident in the implementation framework defined in the previous section, with increasing involvement of private players in municipal services, capital expenditure tends to decrease (for AMC) if PPP contracts are executed in BOO, BOT, BOOT or other similar models where capital costs are made by private agencies.

One such example is the Door/Gate to Dump service whereby AMC has engaged private agencies for Door/Gate collection of MSW. Under this contract, the private agencies make all capital investment, primarily purchase of vehicles to the tune of more than 650 vehicles. The private agencies charge AMC based on the weight of MSW collected measured at the AMC's weighbridge. The rates being charged are inclusive of

- a) Recovery for capital investment made by private agencies for purchase of vehicles, and
- b) Revenue expenditure for fuel, manpower and O&M of equipments/ vehicles

As a result of this, in AMC's budget heads, the capital expenditure is being reflected in higher revenue expenditure.

The above model is unlike the ones adopted in container lifting and 'Spot to Dump' system whereby AMC made the capital investment by purchasing vehicles and equipment and engaged private agencies for operation and maintenance of the same.

## 11. Capacity Building and Training

Ahmedabad Municipal Corporation has been a progressive organization. Many of the reforms that are currently part of the JnNURM were initiated before the JnNURM was introduced. Reforms in key areas of property tax, e-governance, municipal accounting have been initiated by AMC since the late 1990's. AMC has been the recipient of numerous national and international awards and has set an example to other cities.

However, in the wake of upcoming several projects in the sectors of water and sanitation and in the context that AMC has undertaken several capital intensive projects in these sectors, it is important for AMC to prepare a training and capacity building plan. Such a plan will help the organisation to better sustain and manage these investments.

### 1. Determinants of individual capacity comprise:

- Knowledge- Relevant and broad based as well as specific updated information to carry out the defined functions at defined standards of effectiveness and efficiency
- Skills- Specific exposures and experiences as well as adequate practice to enable people to put knowledge in to day to day workings
- Attitudes- Thought processes within and patterns of reacting to external and other human processes stimulus, motivational levels etc.

Training and development are two key strategies to raise/change individual capacity. Training comprises providing structured/semi structured learning inputs to raise knowledge and skill levels and create/emphasise positive/open attitudes.

Development strategy comprises providing varieties of stimulus/exposures to people while on the job. The options available here include:

- Deputations and cross deputations
- Lateral transfers
- Promotions
- Shadowing
- On the job learning through varieties of ways including superiors' guidance, peers help and facilitation etc.
- Mentoring and role model creation
- Exercises of creation of small learning and experimenting groups within organizations for varieties of improvements, special drives/campaigns etc.
- Fast tracking careers of identified people etc.

### 2. Training Strategy for the Ahmedabad Municipal Corporation for improved sanitation

#### a. Maintaining a Database

It would be important to maintain a detailed database of all employees of the Corporation, of different levels of officers showing intervals and details of trainings received in their

careers. The database would also include a list of eligible employees for various training programs which would be prepared in a participatory manner with concerned departments.

b. Framing yearly calendar and norms for training person days

AMC may enforce a policy on the ideal number of training for various groups. It is recommended that at Groups I and II, an ideal of 15 and 12 person days respectively must be invested in training per annum. 10 person days of training should be invested for Group III officials. This timing is recommended and could be fine-tuned looking at the administrative load of officials.

It is also recommended to make a policy to allocate a certain percentage of revenue earned in a year for training and capacity building. The same could be reviewed periodically.

c. Mandatory induction modules with evaluation-

All trainings of induction modules would be evaluation based and mandatory. It should be completed for all in the first year itself.

### **3. Training: Category Wise**

#### **Training for Senior Management Staff**

This would comprise trainings for deputy municipal commissioners, zonal heads, heads of various departments, additional commissioner/s, city engineer, additional city engineer/s.

There is a need for senior management staff to be able to holistically plan and integrate a cross section of views and then take appropriate decisions. The areas covered would range from latest urban trends, policy changes at the state and national level to team building and leadership.

#### **Training for Supervisory Staff**

Management/ Supervisors are responsible for the quality and efficiency of the services in various departments of the Corporation. They comprise of Assistant Engineers, Executive Assistants, and Assistant Town Planners, who interact closely with staff at the operational level. The training programs required for this group would focus on sharpening their functional skills, updating their knowledge base, and develop managerial perspectives. Specifically, this group will be provided training in the areas of skill training, Training in use of computers, Training in interpretation of governing laws, rules and regulations and statues of the AMC, grievances handling, Performance Management and Quality Assurance and Communication Skills

#### **Training for Operational Staff**

This group would include operational staff viz. junior engineers, junior assistants, sanitary sub-inspectors, section officers, assistant secretary, divisional officers and fire officer. This group actually carries out the tasks associated with various functions and are important determinants in ensuring efficient and effective service delivery. The trainings provided to this group would include Functional Skills, Office Procedures, use of computers, General office Administration and Management, communication skills.

#### **Training Programs for Class IV employees:**

An in-house one day program for class IV employees will also be conducted. These programs would be conducted as per their specific jobs in the AMC. For instance, all peons could be grouped together in one batch, separate batches for sweepers and sanitary staff etc.

The training would focus on following areas:

- Their role in the AMC and importance of their role within the entire organisation.
- the processes in which they need to carry out their tasks- reporting,
- technical information on carrying out their jobs (e.g. proper use of implements like brooms, mechanised sweeping equipments, file maintenance, etc.)
- interaction with public
- office etiquettes and ethics
- any normal or abnormal events that they should report to supervisors
- systems and procedures to be followed like signing of musters, collecting salary, leave application etc.,
- the problems that they might encounter and how these could be addressed

#### **4. Induction Training**

A structured training program for employees who join the Corporation at various levels should be conducted. The duration would be of two weeks each. It would aim to provide an introduction to the functioning of the AMC, provide live training and exposure to concurrent problems being faced by AMC; procedures followed etc. induction training should be made compulsory to all staff that is required to have more citizen interface.

#### **5. Specific Training Areas in Sanitation Sector**

Ahmedabad Municipal Corporation perceives training and capacity building requirements in the following areas:

- a. Skill development training for engineers and operating staff for :
  - a. Operation and Maintenance of Sewage Treatment Plants
  - b. Desilting equipments
  - c. Operation and Maintenance and electrical and mechanical aspects of the pumping stations
  - d. Sanitary Landfill Site
- b. Technical knowledge upgradation for:
  - a. Sanitary Landfill site
  - b. Zero discharge system, recycling of sewage
- c. Contracts Management
  - a. Managing Service Delivery
  - b. Contract Administration
  - c. Monitoring and Evaluation
  - d. Standard Operating procedures

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## Annexures

## Annexure 1 Attendance Sheet - CSP Task Force Meeting

**ATTENDANCE SHEET**  
**CITY SANITATION PLAN - TASK FORCE MEETING**

Date 21/2/12 at 5.00 p.m. in Standing Committee Room

Sr. No.	Name of Officer	Name of Dept./Institute	Mobile No.	Signature
1	SHAILESH I. PATWARI	Grp. Chairman of Comm Chairman Env. Committee	9375148534 Spatwari.18@gmail.com	Shailesh Patwari
2	MONA DIER	CEPT UNIVERSITY	9879146618	Mon Dier
3	N. D. Ajmera	DEE. GPCB	9898003096	N. D. Ajmera
4	J. P. Babaria	SO. GPCB	9825685377	J. P. Babaria
5	P. Pangotra	Prof. IIMA	9825845238	P. Pangotra
6	Lajendra Lal	SATH	9825005148	Lajendra Lal
7	A. K. Mishra	Chairman, Achi Bharatiya Parivahan Samiti NGO	9558275312 mishra9913@gmail.com	A. K. Mishra
8	Bijal Bhatt	Mahila Housing Trust	9825029281	Bijal Bhatt
9	MEGHNA MACHOTRA	UMC.	972433444	Meghna Machotra
10	MANVITA BARADI	UMC.	98240 92145	Manvita Baradi
11	I. K. PATEL	DYMC (SWM) AMC	90997 0022	I. K. Patel
12	T. M. Lod.	CITY Engineer, AMC.	977103870	T. M. Lod.
13	ANAND PATEL	ADD. C.E.	9327034232	Anand Patel
14	Kitesh Contractor	ADD. C.E.	9327554910	Kitesh Contractor
15	B. R. Doshi	E.E. AUDA	9825599985	B. R. Doshi
16	Prashant A. Ransga	Dy. Dis, SWM, AMC	932703882	Prashant A. Ransga
17	R. D. Keren	Dy C.E. (Dis. Project)	9377667635	R. D. Keren
18	Naresh R. Pappal	Director - (S.WM)	932723862	Naresh R. Pappal
19	Hemant Dalwadi	UMC	9724642799	Hemant Dalwadi
20	Anurag Anthony	UMC	9601825666	Anurag Anthony
21				
22				



### Annexure 2 Growth of Sewerage Network in Ahmedabad City



Source: Urban Management Centre

Annexure 3 Administrative Map of Ahmedabad

# Sanitation Assessment Study

Ahmedabad

Administrative Map

— AMC New Boundary

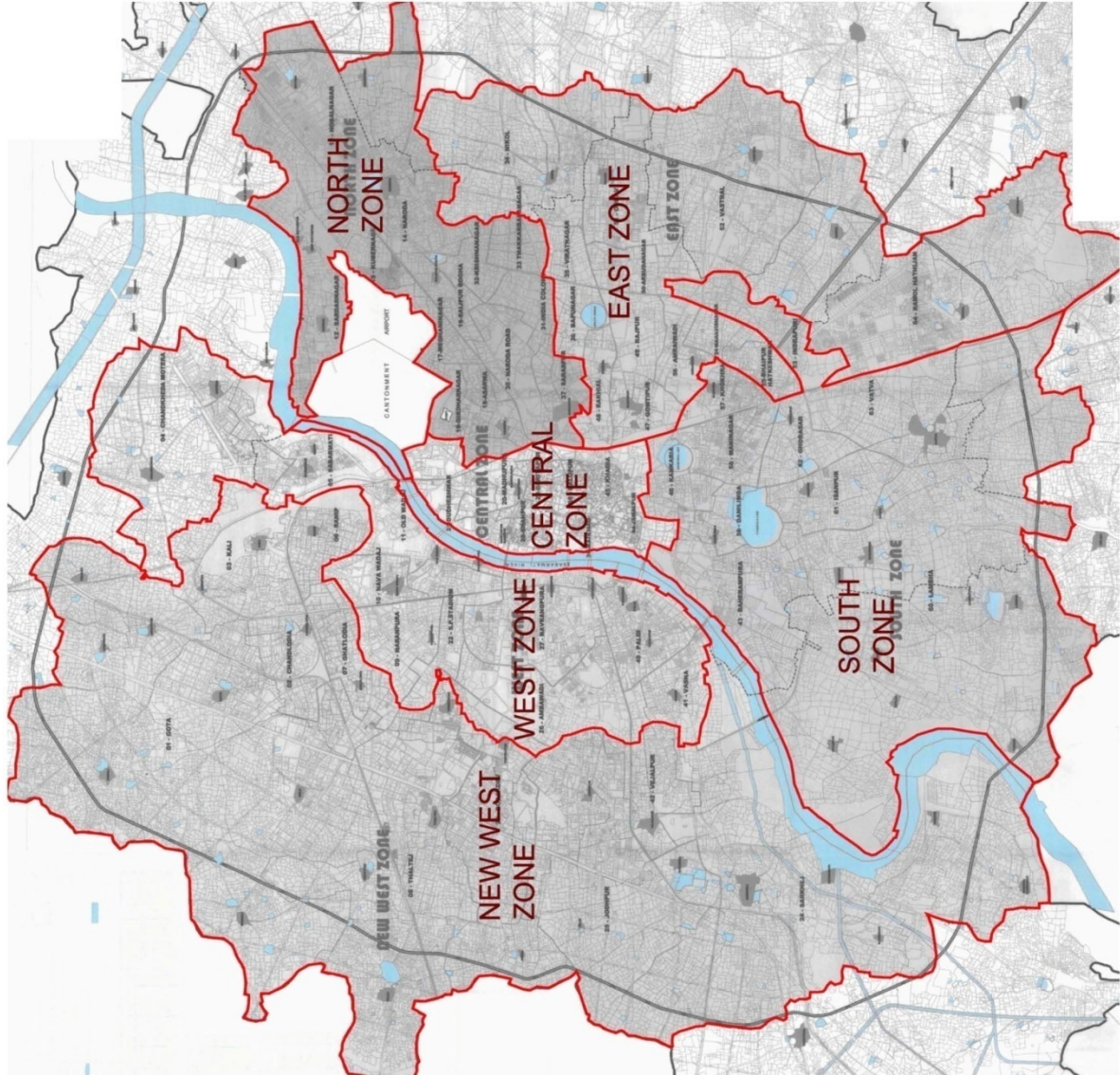


Ahmedabad Municipal Corporation

Prepared By



Urban Management Centre



The drawings are not to scale. All information provided in the maps by AMC. UMC has not conducted any independent mapping or auditing of information provided by AMC.

Annexure 4 Existing Sewerage Network Map of Ahmedabad

# Sanitation Assessment Study

## Ahmedabad

### Sewerage Network Map

- Water Body
- Area covered with Sewerage Network
- Roads
- AMC New Boundary



Ahmedabad Municipal Corporation

Prepared By



Urban Management Centre



The drawings are not to scale. All information provided in the maps by AMC. UMC has not conducted any independent mapping or auditing of information provided by AMC.

Annexure 5 Map showing Solid Waste Management Key Installations

# Sanitation Assessment Study

Ahmedabad

## Solid Waste Management Map

- Dumping Site
- Scientific Land fill Site
- Proposed Transfer Station

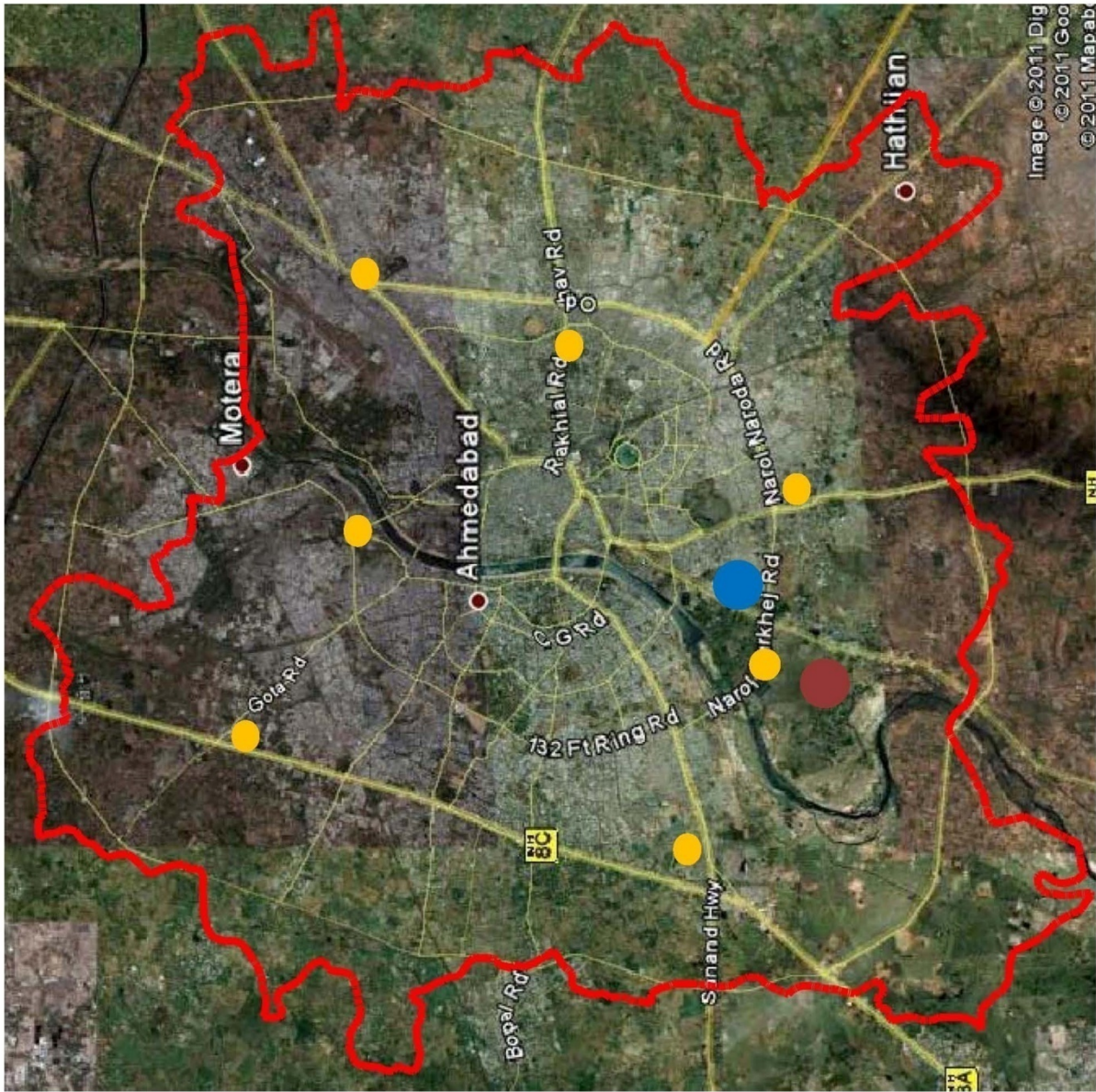


Ahmedabad Municipal Corporation

Prepared By



The drawings are not to scale. All information provided in the maps by AMC. UMC has not conducted any independent mapping or auditing of information provided by AMC.



Annexure 6 Slum Location Map of Ahmedabad

# Sanitation Assessment Study

Ahmedabad

## Slum Location Map

- Slum location
- AMC New Boundary
- Roads

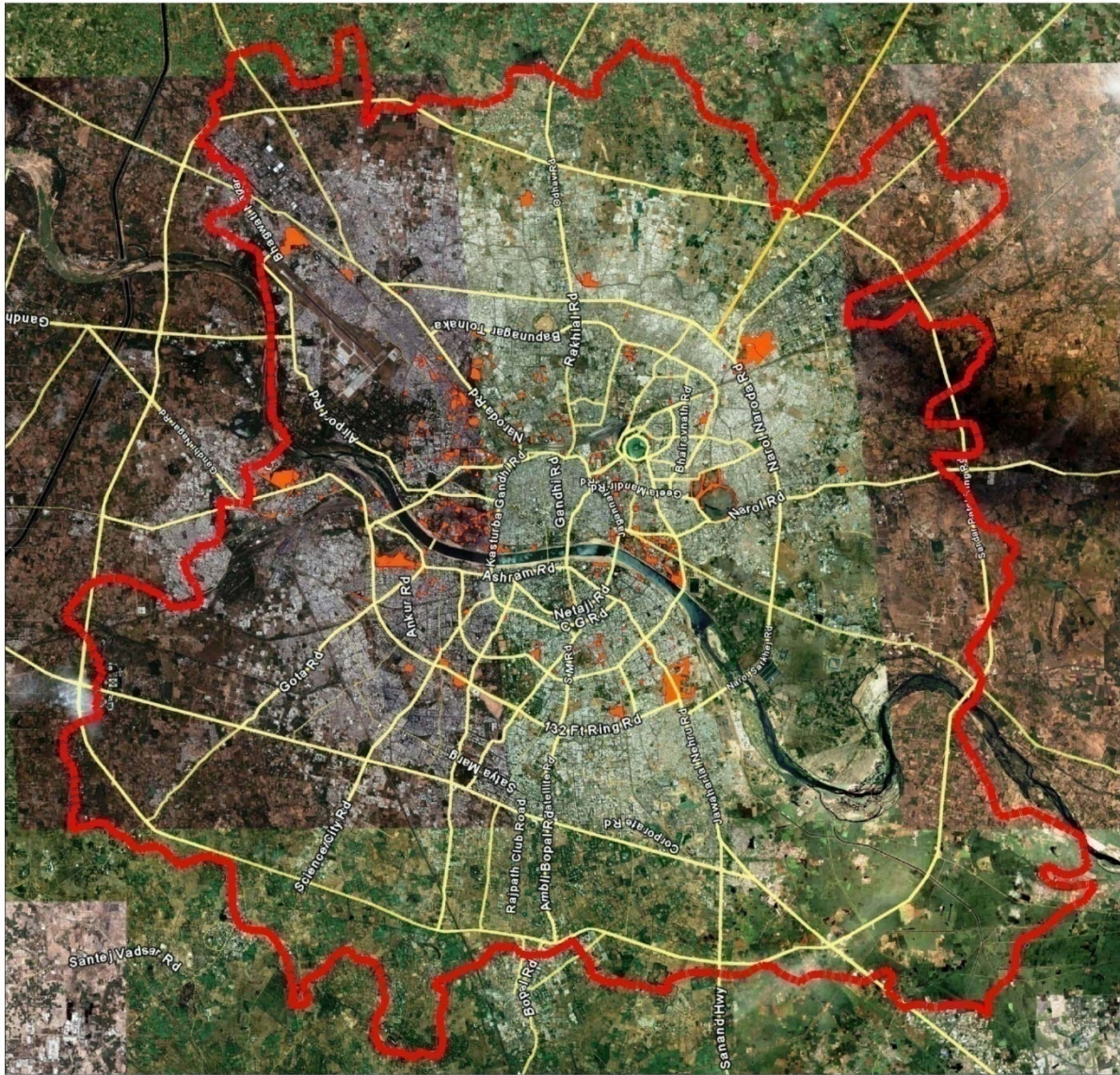


Ahmedabad Municipal Corporation

Prepared By



The drawings are not to scale. All information provided in the maps by AMC. UMC has not conducted any independent mapping or auditing of information provided by AMC



Annexure 7 Coverage of Ahmedabad's Ranking in MoUD's National Sanitation Ranking 2009

# A'bad down in the dumps

## City Rated 19th Among 25 Cities Surveyed For Cleanliness

**AMC IRKED**

The poor rating has irked AMC authorities, who have now questioned the adopted methodology to rate the different cities. On the rankings, a senior AMC official said, "The ranking does not give the real picture of the city. AMC authorities have initiated lot of measures including emphasis on construction of more public toilets than pay & use toilets in the city. The solid waste management plan of the city under JNNURM will start showing its results in next six months when the project will be implemented fully."



**DRINKING WATER IS SAFE**

The drinking water supplied by AMC has been rated safe and passed the stringent laboratory tests conducted by the rating agency. Eighty per cent of the sample municipal water has passed the tests, said professor Madhu Bharti of CEPT University.

*Times of India, Thursday May 13, 2010*

Kumar Manish | TNN

Ahmedabad: Ahmedabad may have been declared a mega city, but its sanitation is yet to live up to the label.

Open defecation is seen as one of the banes of this city, contributing to its low ranking in a national city rating under the National Urban Sanitation Policy (NUSP) conducted by Union ministry of urban development.

professor and head, department of housing, CEPT University, Madhu Bharti said, "The ratings will motivate the cities to do better in improving sanitation facilities. These are indicators for city governance to wake up and take necessary action for robust sanitation management in place."

"Major public awareness, incentives policy for cleanliness and strict monetary fines should also be adopted by the civic body to maintain the proper hygiene and sanitation facilities in the city. AMC can take a leaf out of the improved sanitation facilities in Surat after the city was hit by plague and floods," added Bharti

"Water quality in water bodies in Nikol and Chandola has high bacterial contamination and low levels of oxygen, while Sabarmati riverfront project and Kankaria lakefront development has improved on its water quality", she said.

Three agencies — Centre for Environmental Planning & Technology (CEPT) University, Ahmedabad, AC Nielsen, Development & Research Services Pvt Ltd, New Delhi, were involved to assess the status of sanitation in the cities.

Director of UMC-ICMA which was also involved with CEPT University in rating exercise, Manvita Baradi, said, "The sanitation facilities in urban slums in the city are in deplorable conditions, either the public toilets facilities are non existing or not user friendly."

"The city needs a ward level sanitation action plan to improve the situation on ground and also regular monitoring of municipal waste disposal system," said Baradi.

Rank	City	Marks Scored
1	Chandigarh	73.48
2	Mysore	70.65
3	Surat	69.08
9	Rajkot	56.11
19	Ahmedabad	50.28

Ahmedabad was ranked 19th among 25 major cities on cleanliness, in the country. Also, the city scored poorly in universal access to toilets for all and in proper wastewater treatment, recycle & reuse of municipal solid waste, and in treatment and safely disposal of total solid waste generation in the city.

Even cities like Jamshedpur, Bidhannagar in Kolkata, Kanpur and Shillong in Meghalaya have fared better than Ahmedabad in sanitation parameters in the survey.

Surat and Rajkot beat Ahmedabad to fare among top ten clean cities in the country. The rating task was conducted across 423 urban conglomerates across the country to create awareness on hygienic conditions in urban areas.

On the Ahmedabad ratings,

*Times of India, Thursday May 13, 2010*

# 3 Gujarat cities in India's 'best sanitised' list

Rajkot stood at 9th rank while Ahmedabad was at 19th spot

**DNA Correspondent, AHMEDABAD**

Three Gujarat cities have been named among the best sanitised cities in the country by the union government. Diamond city Surat, which was hit by a terrible plague in 1994, has been ranked as the third best sanitised city in the country, while Rajkot and Ahmedabad have been ranked 9th and 19th, respectively.

The ratings are a part of the National Urban Sanitation Policy aimed at making Indian cities and towns more sanitised, healthy and liveable. The ratings are meant to recognise the good performers and to encourage other cities to follow similar sanitary practices.

Topping the list is Chandigarh, followed by Mysore on the second spot and Surat in third place. New Delhi Municipal Council and Delhi Cantonment complete the top five. Rajkot also made it to the top-10 and is ranked ninth, while Ahmedabad, Gujarat's economic capital, has been ranked 19th on the sanitation parameter. But the other cities in the state did not do too well.

Gandhinagar has been ranked 160th, lower than Mehsana (128), Porbandar (145), Nadiad (153), Bhavnagar (154) and Bharuch (155), while Vadodara was ranked even further below at 232nd place.

Manvita Baradi of Urban Management Centre (UMC), one of the organisations that along with Cept conducted the sanitation survey in cities in Rajasthan and Gujarat said it is a matter of pride for Gujarat that three cities from the state have found a place among top 25 sanitised cities in country.

According to Baradi, the recognition will result in the top cities getting priority in sanitation projects from the union urban development ministry.

**For a better, cleaner life**

**Topping the list is Chandigarh, followed by Mysore on the second spot**

**The ratings are part of the National Urban Sanitation Policy aimed at making cities and towns more sanitised, healthy and liveable**

**According to the Urban Management Centre, the recognition will result in top cities getting priority in sanitation projects from the union urban development ministry**

**A'bad needs to improve, p2**

*DNA. 12 May 2010*

# 'A'bad needs to improve solid waste management'

**Surat's USP is maintenance and monitoring of system to keep city clean**

**NIYATI RANA**

Ahmedabad, regarded as one of the fastest growing cities in Gujarat and the leader in solid waste management practices, was jolted when the Union ministry ranked it 19th among better sanitised cities in India. The city civic body has been seen as a leader in solid waste practice, but it has been found

to lag behind Surat and Rajkot in Gujarat. Manvita Baradi of Urban Management Centre (UMC) — which had conducted the survey for identifying better sanitised cities in Gujarat and Rajasthan, along with CEPT — said that Ahmedabad needs to improve upon solid waste management.

"The main setback for Ahmedabad comes in its denizens' habit of littering. We also found that solid waste management and disposal is not very satisfactory in Ahmedabad. Probably, the situation is like this because a lot of new areas have been merged with the AMC, causing drainage

**'The lesson from Ahmedabad is that only developing a system, i.e. public toilets, is not important; propagating its use is equally important'**

and sanitation problems," said Baradi. She added, Ahmedabad has public toilets but its use is nominal, making it useless in maintaining hygiene. Open defecation is

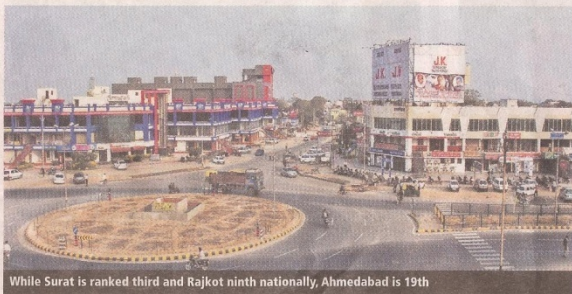
thus seen in Ahmedabad.

She said that the AMC has done a lot of cosmetic work and actual development has been left behind. Praising Surat's solid waste system, Baradi said it has not only developed a good management system but has also maintained and monitored it. "Surat civic body has made it a point to fine denizens if they flout norms and maintain a system to keep city clean. The lesson from Ahmedabad is that only developing a system, i.e. public toilets, are not important; propagating its use is equally important," said Baradi.

**CITY**

# Ahmedabad needs to 'clean up'

Just having public or pay-and-use toilets is not enough; they have to be well-maintained too: CEPT prof who rated city for sanitation



While Surat is ranked third and Rajkot ninth nationally, Ahmedabad is 19th

**DHWANI PATHAK**

Ahmedabad ranked 19th among best sanitised cities in the country. It was beaten by Surat which ranked third and Rajkot which stood 9th in the list. The survey was conducted in 423 class-I cities. Garbage collection, cleanliness and sewage management were some of the

criteria that was taken into consideration said Prof Madhu Bharti of CEPT university. The varsity was one of the three agencies who conducted the survey for the National Rating and Award Scheme for Sanitation for Indian Cities. Bharti says, "This survey has set a benchmark. It will act as indicator to a city's growth." It was calculated out on the basis

of three parameters: output indicators, process indicators and outcome indicators.

Bharti says, "The first indicator talks about the services available. This carried 50 marks. It factors in the number of people who defecate in the open (5-8% in Ahmedabad), how sewage is managed and treated. The amount of littering that takes place (Surat trumped Ahmedabad and Rajkot here)."

**'COLLECT GARBAGE MORE THAN ONCE IF NEEDED'**

She continues, "If more waste is generated at a particular collection centre, it has to be cleaned more than twice a day. There cannot be a blanket concept for all."

Process indicators is about proper documentation. "We are doing better in this but

are not as good as Surat," she says.

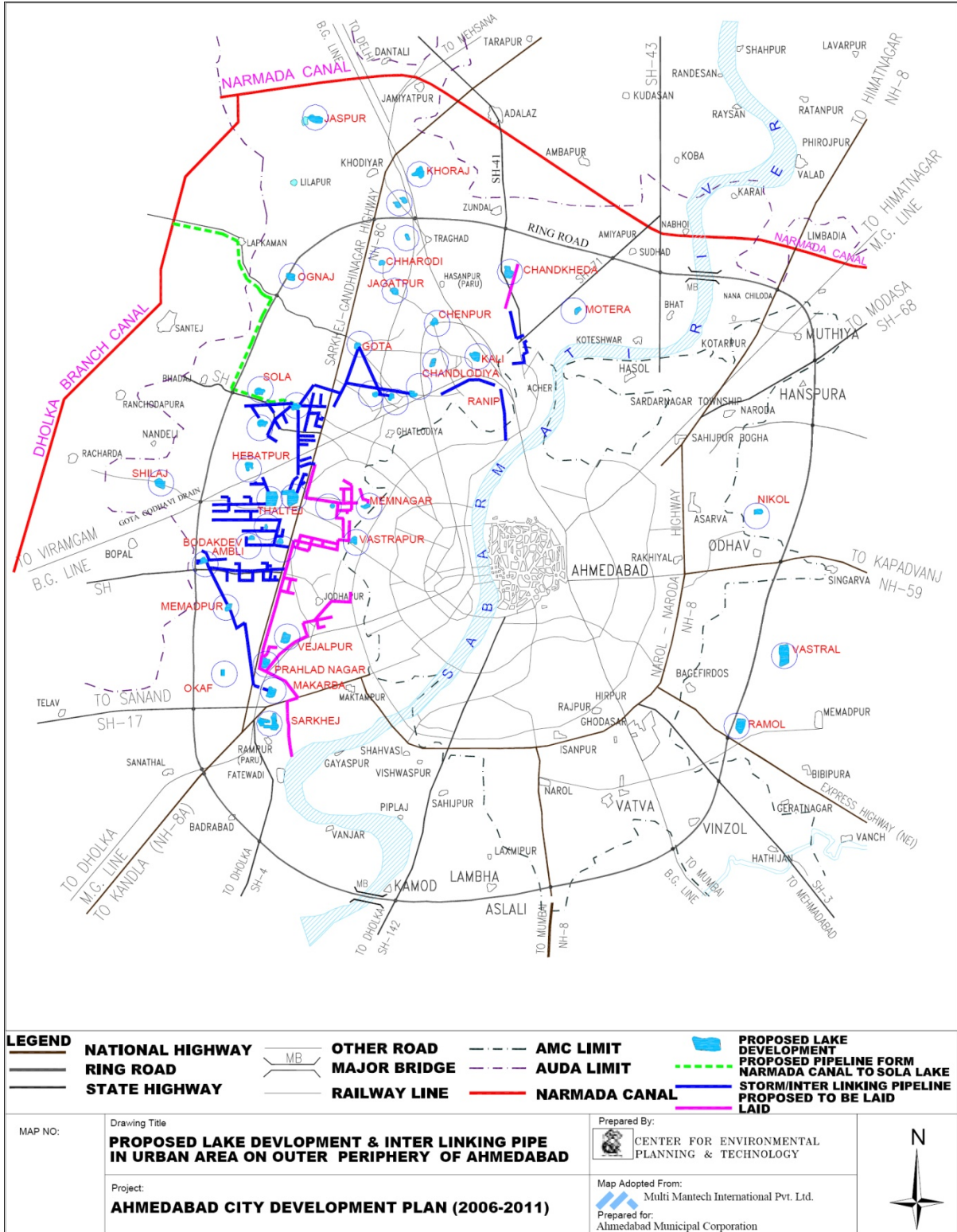
The outcome indicator is about the quality of water. This is not only about the drinking supply but also surface waterbodies. "We collected 25 samples including those from Vastrapur lake and Kankaria lake," says Bharti. Mehsana got lucky in this third category as it does not have any surface waterbody and automatically per-

formed well.

"Just having public or pay-and-use toilets is not enough, it has to be well-maintained too," she adds.

The professor believes the survey should have more common grounds. "Bigger cities performed better than smaller ones as they have more experts. Chandigarh, Jamshedpur and Rourkela will obviously do better as they are design cities."

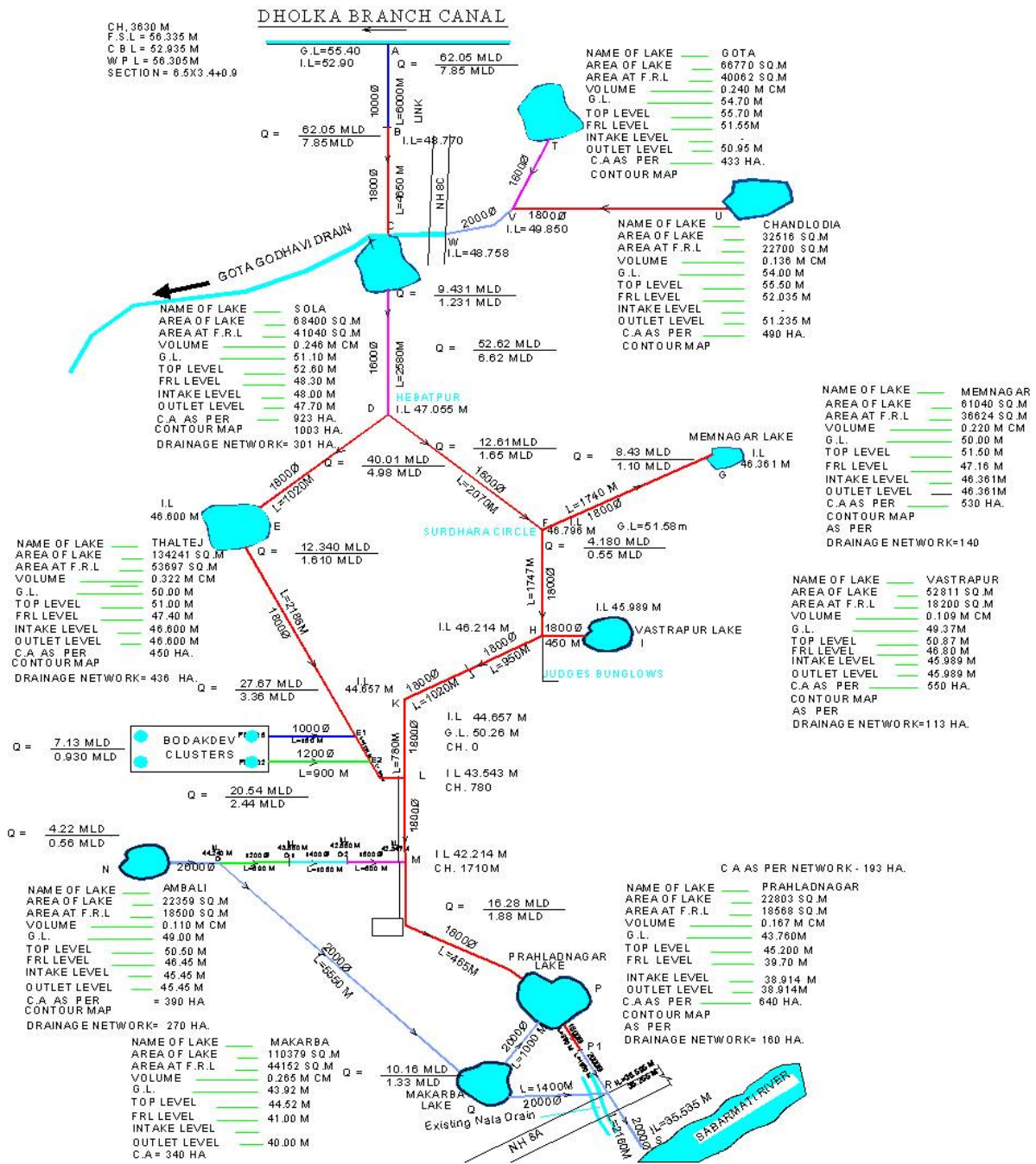
Annexure 8 Lakes Interlinking Project, AUDA



Source: (CEPT\_University, 2006)



Annexure 9 Map showing Lakes Interlinking Project in New West Zone



Source: (AMC, 2011)

Annexure 10 Best Practice for E-Governance (Vejalpur Municipality, pre-2006)

**Urban Reforms through E-Governance- Vejalpur Municipality**  
**(This leading practice dates pre-merger within Ahmedabad Municipal Corporation in 2006)**

Abstract

***Vejalpur is one of the urban conglomerates outside Ahmedabad Municipal Corporation (AMC) limit, and under Ahmedabad Urban Development Authority (AUDA) jurisdiction. However, prior to 2006, Vejalpur was a municipality and like most other ULB's faced issues with regard to the implementation of its role as an agency for service to citizens. In order to remedy the situation, the governing board took a far reaching decision in the early 2000s to computerize most to the roles of the municipality. This action was highly effective, with efficiency levels within the municipality improving, redressal systems functioning, citizens being more satisfied and basic costs of functioning being reduced.***

**- *Situation before the Initiative***

Vejalpur was an "A" Class Municipality located at the fringes of the Ahmedabad Municipal Corporation. Before the computerization of operations in Vejalpur, most operations (general administration, certification/licensing, taxation, accounts, solid waste management (SWM) and complaint redressal for water supply, street lighting and other services) were manual. Because of manual intensity of these tasks, the shortage of staff was always an issue. Combined with low pay, this became an excuse for poor performance. Poor service affected the citizens and delays were standard procedure. Furthermore, the establishment lacked transparency and accountability. Other critical issues in the services of the municipality included:

- Misplacement of manual records
- Poor MIS
- Inaccurate tax and interest calculation as well as absence of efficient collection system
- Lack of a complaint and redressal mechanism
- Poor interaction with citizens; No single point of service or information, both to management and citizens;

**- *Strategies Adopted***

In order to improve the situation, the municipality decided to make an effort to reform systems. As part of this reform initiative, the Elected Body resolved to introduce e-governance.

The major objective of the total e-governance through city civic centres is to treat all citizens like customers of a large corporate organisation. The duties enumerated in the "Citizens' Charter" have been computerised and made more user-friendly. The following processes were computerized

- Birth & Death registrations since 1994,
- Trades and Trade License holders and non-holders,
- Water supply billing and collection,
- Payroll,
- SWM,
- Property tax Self-assessment scheme,
- billing and collection,
- Public grievances,
- Infrastructure details,
- Tenders,
- Accounts (single entry; double-entry process under implementation)

Furthermore, the internet was used as a vehicle for providing faster and efficient services by the municipality. The municipality launched its website- [www.vejalpurnagarपालिका.com](http://www.vejalpurnagarपालिका.com) not only as information source but also utility and grievance driven. Some of the key facilities offered were:

#### **Complaints Redressal**

All 12 wards are connected through internet to receive and redress complaints on civic amenities or matters related to tax etc. The online complaints of citizens are directly received by the Chief Officer and are automatically directed to the concerned officer. The monitoring mechanism enables every office to identify problems, and coordinate laterally or vertically through intranet in such a fashion that complaints are redressed within 24 hours.

#### **Payments of all municipal Dues**

The simplified tax calculation system of more than 40,000 properties has been put on the website for access. Citizens can view details of any property and its tax assessment. This has eliminated the doubt that the 'neighbour' has been assessed with lesser tax.

Local banks have been connected with municipality's intranet to collect taxes. The manual calculation has been replaced by automatic mode to assess real time demand and collection.

#### **Online Registration & Issuance of Birth and Death Certificates**

The municipal website provides access to all hospitals to register births and deaths online. The entire operation of collecting the information from the hospitals and maintaining it in the muster records used to take enormous time. The manual record keeping made it impossible to search and deliver the certificates in a limited time.

#### **Issuance of Licenses for Shops and Establishments**

The city Civic Centres issue licenses promptly. Renewals are also possible across the counter. The system also enables to collect the fees for sign boards/hoardings which could not be collected manually earlier.

#### **On-line information on Infrastructure Projects and Tenders**

The website had online information on the infrastructure projects and related tenders in which attracted many well qualified contractors from all over the country. The payment procedures through bank to bank accounts, has reduced the procedural delay and increased the confidence of the contractors. All the pay-ins of the municipality as well as pay-outs are handled through two banks.

#### **- Results Achieved**

- Online office administration, monitoring/control mechanisms and service provision introduced – led to better time-management and paperless office administration
- Three civic centre's established for time-bound complaint redressal and service provision
- General Administration staff not increased
- Transparency, accountability, service delivery improved
- Tax collection increased from 15% to 65%, establishment cost reduced to 8% of the budget ,income surplus over expenditure achieved

#### **- Sustainability**

Ahmedabad Municipal Corporation (AMC) is happy to have Vejalpur- a well managed municipality, as part of its jurisdiction, which has achieved services to a great extent.

- **Lessons learnt**

While E-governance is an excellent tool for achieving good governance, mere computerisation of existing data cannot be taken as e-governance. Political will and dedication of elected wing is an absolute, indispensable necessity for taking significant decisions.

- **Transferability**

Many municipalities in Gujarat, on the direction of the Government, are in the process of adapting the Vejalpur e-governance model.

## Annexure 11 Details of 500 NOC Scheme

### The 500 NOC Scheme

AMC launched the 500 NOC Scheme in 2002. As the name suggests, it aims at providing slum residents with a 'No Objection Certificate' (NOC) that enables them to apply for legal individual sewerage and water connections for their dwellings. '500' relates to the amount the applicant has to pay to get the NOC (This amount was later revised to INR 1,500 as demand grew).

A Gujarat High court's interim order on Special C.A. No. 2716/ 2001 dated 1<sup>st</sup> May, 2001, led to a resolution of the standing committee of Ahmedabad Municipal Corporation to provide "No Objection Certificate to those families staying in slums, chawls having dwelling unit less than 40 sq.mt. to get legal water, drainage and electricity connections to their house." (AMC, Circular No. 543). This was approved by the General Body of the Municipal Corporation on 28<sup>th</sup> September, 2001 (AMC, Circular No. 449). With reference to above, The Gujarat High court gave interim order on 19<sup>th</sup> October, 2001 saying that, "Till this petitions are finally decided, we direct the Ahmedabad Municipal Corporation & the Ahmedabad Electricity Co. Ltd to provide water, drainage and electrical connection to the hutments dwellers or occupants of slums or chawls or of the houses which fall within the definition of "hut" as given in the said act, without insisting for B.U. permission, however subject to the relevant Rules, Regulation and conditions laid down for obtaining such amenities."

### Guidelines issued by Ahmedabad Municipal Corporation:

1. NOC to be given for obtaining water, drainage and electricity connection only.
2. Drainage connection to be provided only if network available.
3. New water connection to be provided only if water network available as per standard if adequate quantity of water available.
4. A list of applicants would be prepared and work to be undertaken on priority based.
5. NOC for water, drainage & electricity connection is given with reference to interim order of Gujarat high court. The beneficiary has to sign a bond stating that they will abide by the final decision of high court as applicable on the matter.
6. "No Objection Certificate" will not be given for huts located on AMC reserved plot, Govt., land and TP roads.
7. Water & drainage network to be constructed with appropriate design and with good quality material. Beneficiary has to sign a bond for upgrading their pipe network at regular interval, if they are using pipes of materials other than cast iron.
8. The authority has been given to Zonal Deputy municipal commissioner for granting NOC for water, drainage & electricity connection.
9. Zonal Dy. Municipal commissioner. Shall be the final authority to take decision on above matter.

This circular clearly says that, "**No Objection Certificate**" does not mean **Building Use permission**.

### **Eligibility:**

All the households have to fulfil the following criteria:

- 1) The applicant should be residing in a slum dwelling of no more than 40 sqmt
- 2) the applicant should have some type of residence proof, such as Ration card, Voter ID, or Tax or Electricity Bill or 7/12 utaro (Any one).

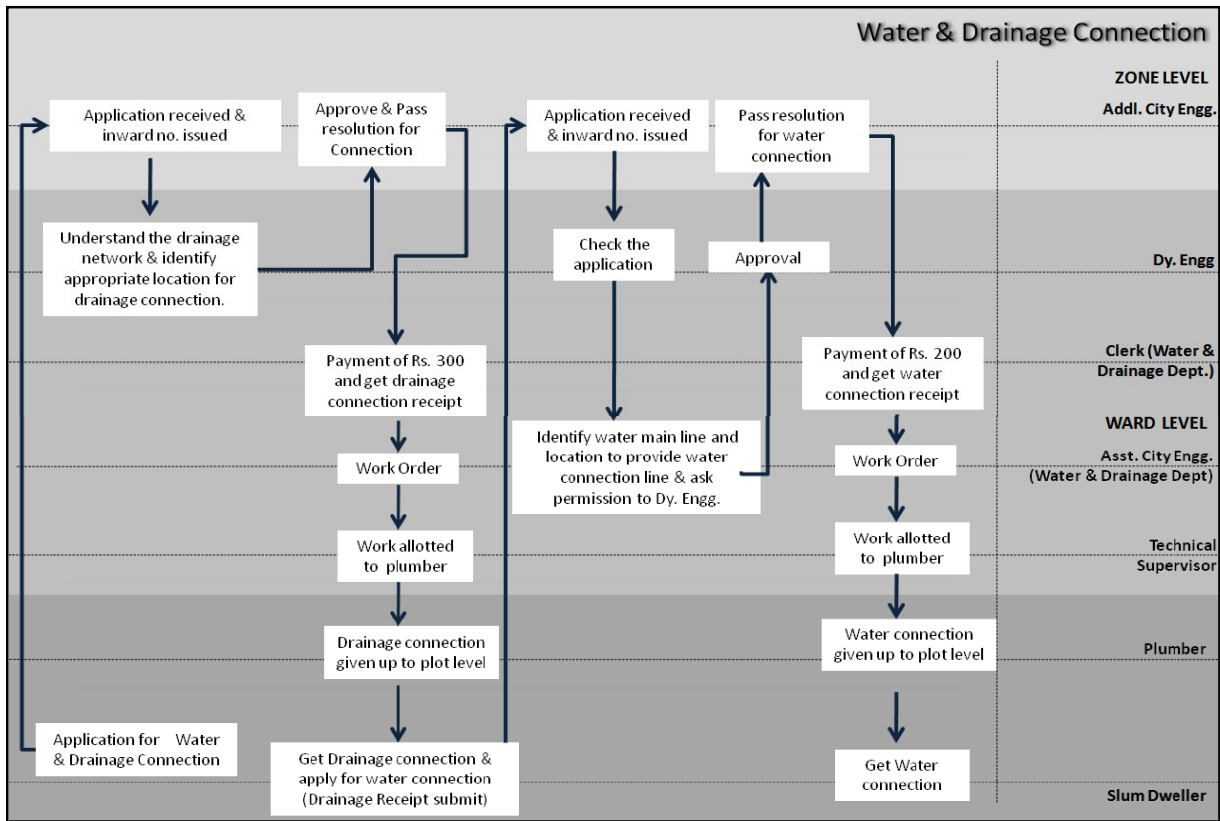
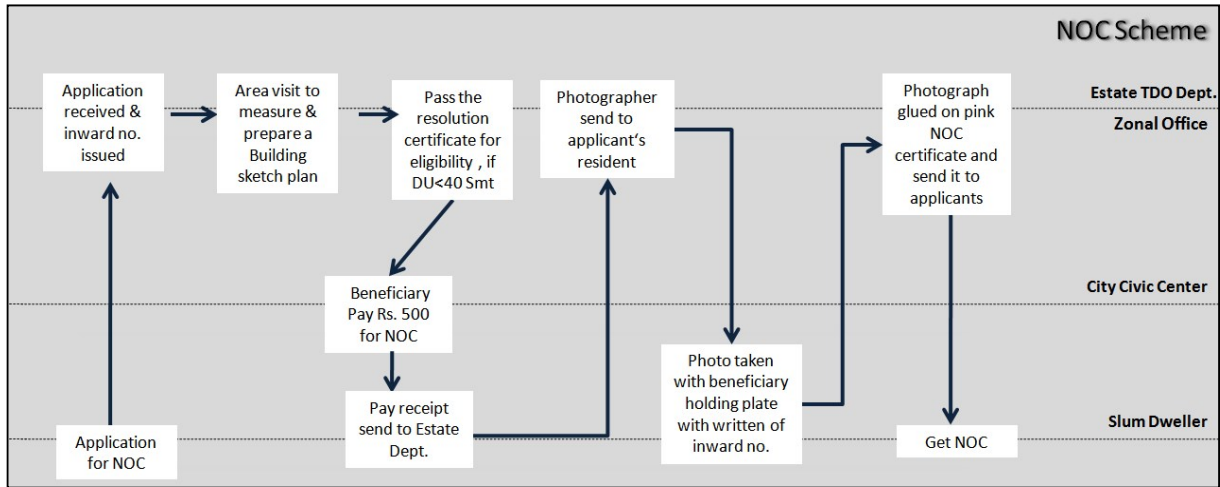
### Documents that are required to be submitted by applicants:

1. Copy of 7/12 as a proof for land ownership or copy of property card to verify whether land belongs to private or government.

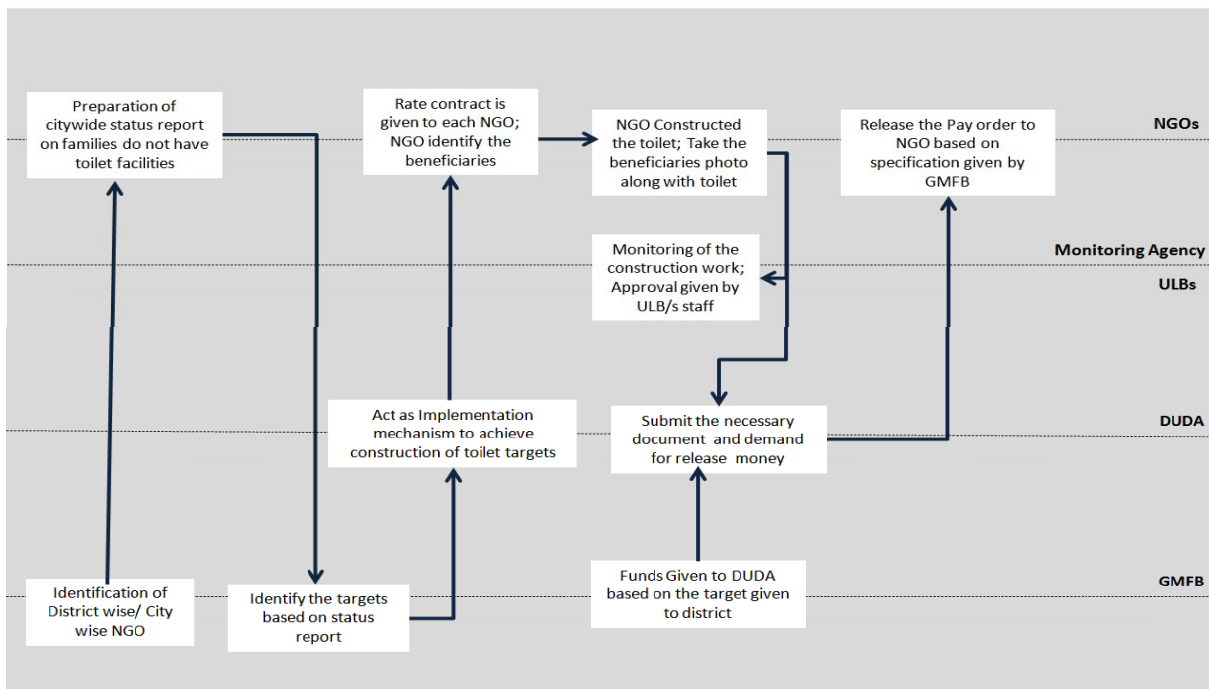
Or

- The applicant should have residence proof like ration card, property tax payment receipt, voter I.D., or electricity bill.

**Flow Chart of the Process**



## NGSP (GMFB) Toilet Scheme

**Process of Implementation:**

1. Any individual can apply for the scheme. (Alternatively, an NGO can identify potential beneficiary communities, raises awareness among the residents, and organizes the households willing to participate in the Scheme.)
2. An individual applies to the zonal office on a form available there for INR 10. Individual has to submit a proof of residence along with the form. The zonal office issues an 'inward number' to the applicant. (Alternatively, the NGO delivers the application forms to the community, collects the INR 10 fee with the completed forms, and INR 500 for the NOC. The NGO then takes the documents to the Zonal Office to pay the fees there; in turn the administration issues inward numbers, which the NGO takes back to the community. NGO give a *kutchra* receipt to beneficiary.)
3. An officer from Estate department visit applicant's residence to measure and prepare building plan sketch. (Alternatively, NGO arrange a site visit and accompanies the officer in order to speed up measurement and drawing).
4. If the dwelling is eligible for the NOC in terms of the criteria listed above, i.e. less than 40 sq.mt, the estate department of the zonal office issues a "resolution" certificate to the City Civic Centre (CCC). (It's time consuming process because resolution is to be passed after 10-15 applicants apply for NOC.)
5. Beneficiary has to pay INR 500 to tax department or CCC and get NOC receipt. (NGO co-ordinates with estate department, they collect a list of beneficiaries and directly pay INR500 to tax department and get a NOC Receipt.
6. After the individual household has taken the payment certificate back to the zonal office, a photographer is sent to the resident's house to take a photo of the residence with the applicant holding her 'inward number' on a small chalkboard.
7. This photograph is then glued onto the bottom of the pink NOC certificate, and both together are laminated into plastic to ensure the longevity of the document. The NOC is sent to the applicant who is then able to apply for legal individual water and drainage connections, or to legalize existing illegal connections.
8. If the applicant's dwelling unit is more than 40 sqm then he/she can fill another form in the name of other person of family and produce a separate document on the name of second applicant to AMC. Then, same procedure is applicable.

Individual Water & Drainage Connection:

1. The applicant is eligible for a water connection only if s/he possesses a drainage connection. S/he is required to apply for a drainage connection and is only then eligible for water connection. This is done following the similar procedure/steps explained above.
2. If the applicant does not have a drainage connection, s/he has to apply for the same to the sub-zonal office or CCC along with NOC receipt and latest tax bill.
3. This application is sent to dy. city engineer.
4. The concerned civic official checks for the existing network availability, and if found feasible, sends the application back to the assistant city engineer along with the site map and location permission.
5. After getting permission from assistant city engineer, the dy. city engineer passes a resolution permitting the drainage connection for the applicant. In case of non-feasibility of a water connection, permission will not be granted for drainage and therefore, the water connection.
6. Once the resolution is passed and permission is granted, the applicant is expected to pay INR 300 for the drainage connection and get the receipt.
7. The duplicate receipt and the application are sent back to dy. city engineer who then sends the documents to the concerned ward's technical supervisor.
8. The work is then allotted to a plumber and the applicant gets the drainage connection. This procedure takes minimum of 10 days. The applicant gets the connection up to plot level at AMC's cost.
9. For procuring individual water connections, the procedure remains the same, except that s/he has to pay additional INR 200. Here, the cost of puncturing and road cutting up to settlement level is borne by AMC. The miscellaneous costs like road cutting and filling within the settlement, pipe cost etc. has to be borne by the applicant.

Cost for the services

- Application form for NOC: INR 10
- NOC Fee: INR 1500/500
- NGO Fees: INR 100 per HH (If NGO involved in the process)
- Drainage Connection Fee: INR 300
- Water Connection Fee: INR 200
- Miscellaneous Charges: INR 500-550\*

\* Miscellaneous charge varies and is location-specific. It also varies across zones. It consists of cost of pipeline, road cutting and filling. This charge depends on the kind of contract awarded to contractors.



**Sample Copy of NOC:**

**અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન**  
સરદાર પટેલ ભવન, દાણાપીઠ, અમદાવાદ-૩૮૦ ૦૦૧. તારીખ :


વોર્ડ નં. ૮ (વાસણા)  
એસ્ટેટ નં. ૧૦૨ વિકાસ ખાતે  
ડો. રામજીભાઈ શાહ, વિકાસ  
બુક નં. 157 નંબર : 36  
ખાતું :  
નંબર :  
ફેક્સ : ૯૧-૦૭૯-૫૩૫૦૯૨૬

ટે.નં. ૫૩૯૧૮૧૧ થી ૫૩૯૧૮૩૦  
પ્રતિશ્રી, ડા. ફરિહ જવાનમ અવનમ  
સરકારીંગોર  
વાસણા  
અમદાવાદ

વિષય : ૪૦ ચો.મી. સુધીના કાર્પેટ એરિયાવાળા રહેણાંકના મકાન માટે “ના વાંધા પ્રમાણપત્ર” બાબત.  
સંદર્ભ : (૧) ના ગુજરાત હાઈકોર્ટ દ્વારા સ્પે. સી.એ. નં. - ૨૭૧૬/૨૦૦૧ તથા સંલગ્ન મેટર્સમાં,  
તા. ૧૯-૧૦-૨૦૦૧ નો હુકમ.  
(૨) આપની તા...../..... ની અરજી. - 3740

આપની અરજી અનુસાર મોજે ગામ અમદાવાદ ના રે.સ.નં./સીટી સર્વે નં. ૫૪૫૫ /  
ટી.પી. સ્કીમ નં. ૨૨૬, એફ. પી. નં. \_\_\_\_\_, સબ પ્લોટ નં. /ડિસ્સા નં. \_\_\_\_\_,  
મકાન નં. \_\_\_\_\_ ની મિલકત માટે લાઈટ, પાણી તથા ગટરની સગવડ મેળવવા માટે “ના વાંધા પ્રમાણપત્ર”  
આપવામાં આવે છે.  
આ “ના વાંધા પ્રમાણપત્ર” થી ઉપરોક્ત બાંધકામ કાયદેસર થતું નથી તથા માલિક અને કબ્જેદાર તરીકેની  
કાયદેસરની માન્યતા મળતી નથી કે આપવામાં આવતી નથી.

Shah સબ ડી. ઇ. ડો. ઇ. ડો. ઇ. ડો. ઇ. ડો. ઇ.  
અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન  
(પ્રતિષ્ઠા મોલ ઝોન)



**Issues in 500 NOC Scheme**

These issues have been compiled based on the team’s interaction with the Vikasini Maha Mandal members on the 20<sup>th</sup> March.

The Mahila Housing Trust has facilitated the formation of several settlement level CBOs. At the settlement level, it was realised that the successful mobilisation at the local level should be further linked to city level issues and taken-up one step and that women should be exposed and linked to city level issues. The MHT had also decided that once they had formed about 100 mandals, they would make a federation of these mandals. MHT organised a workshop with the 100 mandals that they had they had been instrumental in setting up and as an outcome of it, decided to form a Mahamandal – a bigger federation including some of the members of all the mandals. This federation was given the name Vikasini meaning ‘woman as a developer’<sup>21</sup>.

<sup>21</sup> “Mobilizing Women for Change – Case Study of Sanjaynagar, Ahmedabad”; paper written by Bijal Bhatt, Pooja Shah for Centre for Urban Equity, CEPT University

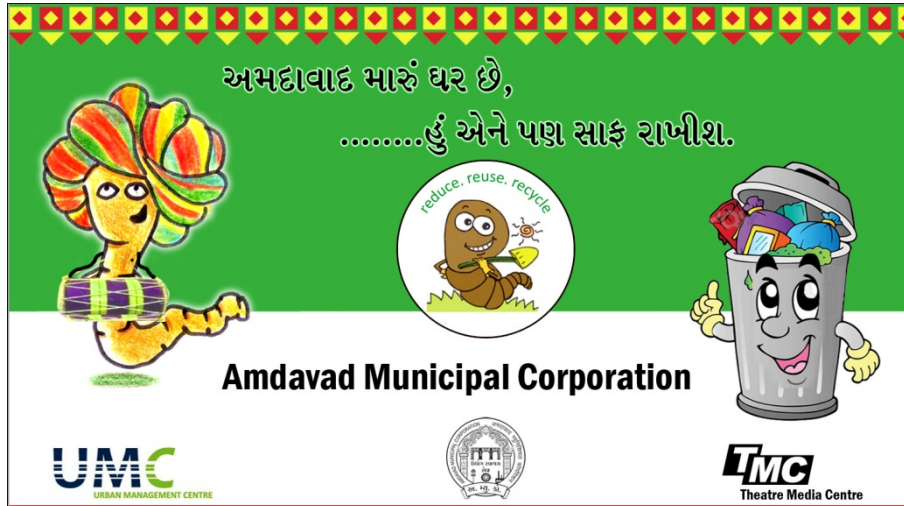


1. The eligibility criteria of properties smaller than 40 sqm for 500 NOC scheme seems to be exclude the real needy households. Since households are found ineligible to apply for the scheme, they either resort to illegal connections or share the legal connections.
2. There needs to be a single window system for the sanction of 500 NOC scheme. As is evident from the process diagram above, the slum dwellers/ NGO has to meet with several departments for submitting the form.
3. There is a separate procedure for obtaining water and sewer services. AMC gives a sewer connection prior to providing a water connection. This should be packaged together.
4. It takes almost 6 months only to submit the form and another 2.5-5 years for the actual services to be installed.

**Annexure 12 List of Assumptions for calculating demand gaps for sanitation services**

- Assumption 01: Floating population of the city – 5 percent of total population  
 Assumption 02: Local city dwellers using public toilets – 1 percent of total population  
 Assumption 03: Around 50 percent of existing toilet seats in need of repairs and refurbishment  
 Assumption 04: New toilet seats needed – 1 percent of existing seats (to ensure access in public areas)  
 Assumption 05: Total number of toilet seats would be shared equally for men, women and differently-abled  
 Assumption 06: Male and female urinals to be computed @ 1 for every 200 users, no separate urinals for differently-abled. All existing men's urinals would be refurbished to ensure water connections, drainage, meeting other design standards, etc.  
 Assumption 07: Number of bathing units needed has been assumed to be 1/3<sup>rd</sup> of total toilet seats in the city for men and women and 1/6<sup>th</sup> of total toilet seats for differently-abled. The bathing units are to be placed at transit locations.

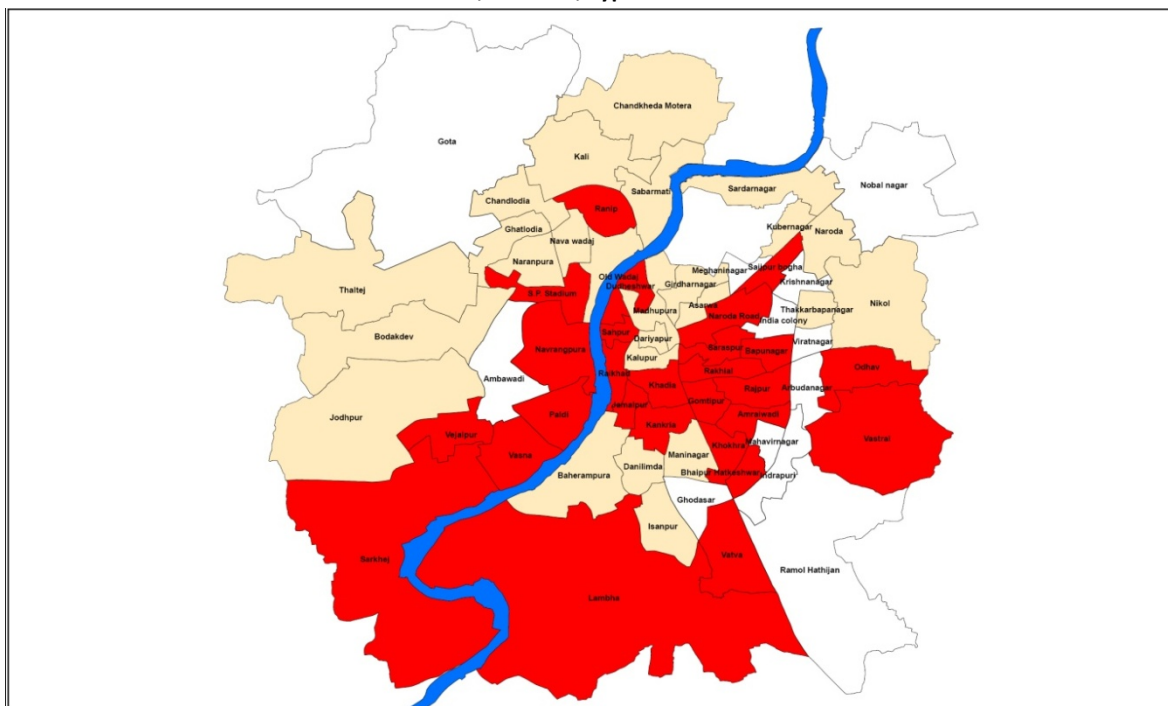
**Annexure 13 Samples of print content designed for IEC Campaign being undertaken by AMC for SWM**





Source: UMC

**Annexure 14 Wardwise Trend of Gastroenteritis, Jaundice, Typhoid & Malaria Cases in Ahmedabad**



**Trend of Gastroenteritis Cases per lakh Population: 2008-10**

**Thematic Maps For AMC Health Department**

Prepared For :  
Ahmedabad Municipal Corporation (AMC)

Prepared By:  
Urban Management Centre (UMC)



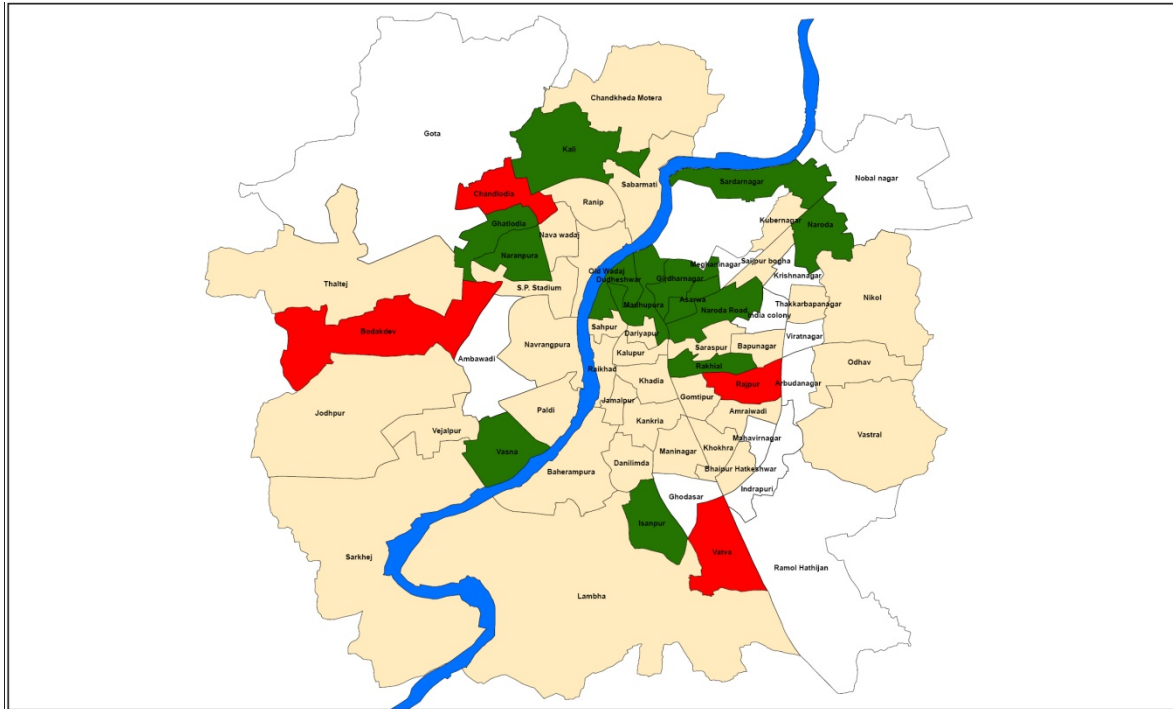
All Data Presented in the Maps is Based on  
Indoor Cases From Reporting Units of AMC



Map not to Scale

**Legend**

- Sabarmati River
- Consistent Increase
- No Trend
- ND



Trend of Jaundice Cases Per Lakh Population - 2008-10

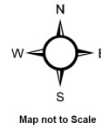
Thematic Maps For AMC Health Department

Prepared For :  
Ahmedabad Municipal Corporation(AMC)

Prepared By :  
Urban Management Centre(UMC)

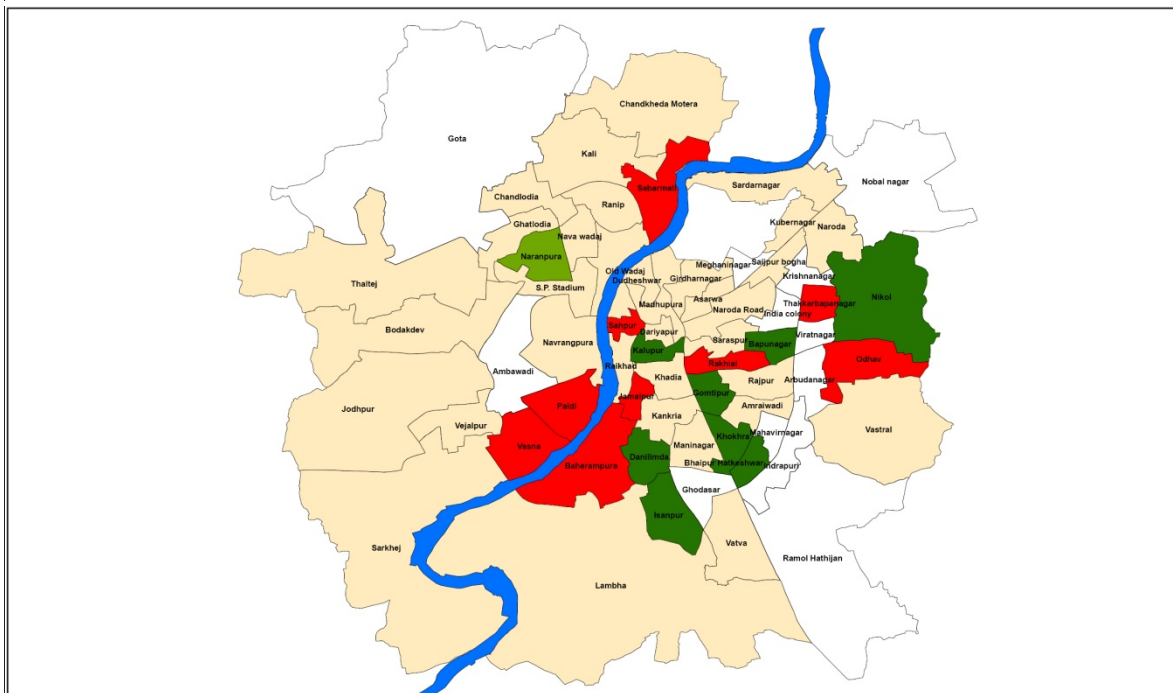


All Data Presented in the Maps is Based on  
Indoor Cases From Reporting Units of AMC



Legend

- Sabarmati River
- Consistent Increase
- Consistent Decrease
- No Trend
- ND



Trend of Typhoid Cases Per Lakh Population - 2009-11

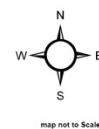
Thematic Maps For AMC Health Department

Prepared For :  
Ahmedabad Municipal Corporation(AMC)

Prepared By :  
Urban management Centre(UMC)

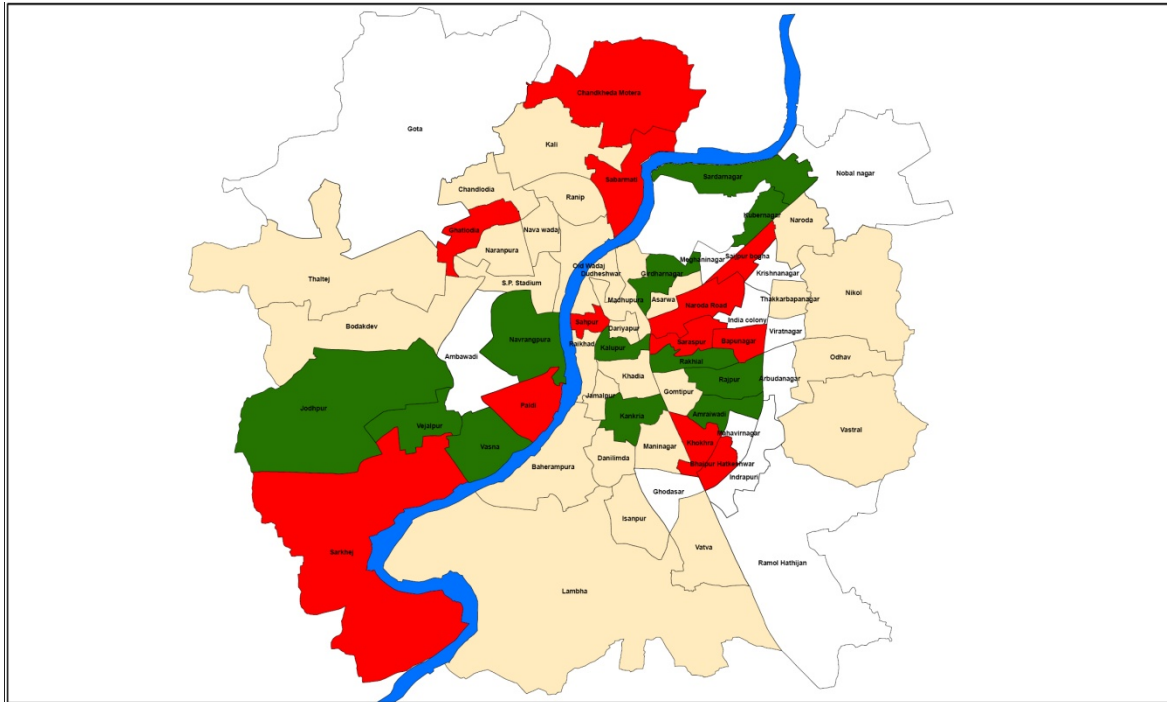


All Data Presented in the Maps is Based on  
Indoor Cases From Reporting Units of AMC



Legend

- Sabarmati River
- Consistent Increase
- Consistent Decrease
- No Trend
- ND



**Trend of Malaria cases Per Lakh Population - 2008-10**

**Thematic Maps For AMC Health Department**

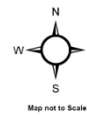
Prepared For :  
Ahmedabad Municipal Corporation(AMC)



Prepared By :  
Urban Management Centre(UMC)



All Data Presented in the Maps is Based on  
Indoor Cases From Reporting Units of AMC



**Legend**

- Sabarmati River
- Consistent Increase
- Consistent Decrease
- No Trend
- ND

Annexure 15 EOI Issued by AMC for Processing MSW from Dead Animals



**Ahmedabad Municipal Corporation**  
**Solid Waste Management Department**

Municipal Central Workshop Compound, Opp. Sahakari Lati Bazar,  
Nr. S T Stand, Jagannathji Road, Ahmedabad- 380022  
(O) 079-3298 2385, Fax No. 079-2532 1484  
E-mail: swm@egovamc.com

**Expression of Interest for Design, Construction, Operation & Maintenance of a daily 10-15 tons processing plant for safe disposal of Carcasses of animals & waste from slaughter house, fish market, meat market etc. on Public Private Partnership mode for 30 years**

Solid Waste Management Department of Ahmedabad Municipal Corporation (AMC) is inviting offers from interested agencies who are willing to Design, Construct, Operate & Maintain a daily 10-15 tons processing plant for safe disposal of carcasses of animals & waste from slaughter house, fish market, meat market etc. (the technology must be compatible to process such waste along with other biodegradable waste) on Public Private Partnership mode for 30 years as per rules, norms & regulations of MoEF, CPCB, GPCB etc. Interested agencies are requested to submit 'Expression of Interest (EOI)' before 5 pm, 02/04/2012 at this office at address given above in sealed cover through speed post / registered post. General information about the project can be viewed / downloaded from our website [www.egovamc.com](http://www.egovamc.com).

DY. MUNICIPAL COMMISSIONER  
SOLID WASTE MANAGEMENT  
AHMEDABAD MUNICIPAL CORPORATION

Annexure 16 Samples of Mini Garbage Vans with lower loading height being used around the world



Source: <http://jalopnik.com/225943/barcelona-come-for-the-food-stay-for-the-worlds-cutest-garbage-trucks>



Source:

<http://www.ominousweather.com/GarbageTruck.html>



Source:

[http://1.bp.blogspot.com/\\_xRFNBWST25E/SvrtH5yBB8I/AAAAAAAAEIM/BKkiWtf\\_ygM/s1600-h/Painted+Garbage+Truck+Kyoto.jpg](http://1.bp.blogspot.com/_xRFNBWST25E/SvrtH5yBB8I/AAAAAAAAEIM/BKkiWtf_ygM/s1600-h/Painted+Garbage+Truck+Kyoto.jpg)

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Ahmedabad – 380014  
Gujarat